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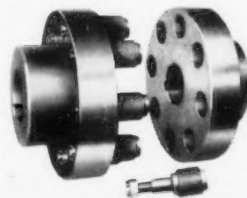
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# This Week in The Iron Age

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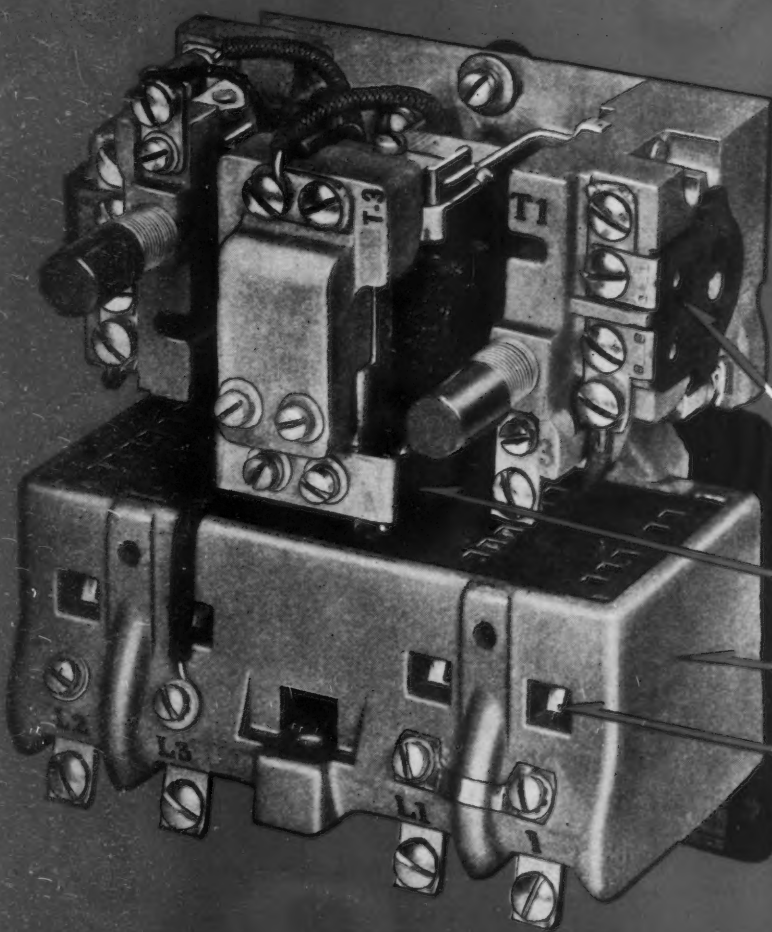
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## When They Say "No"

IN THESE upside down days, when conditions are reversed and purchasing agents take salesmen to lunch, the word "no" is getting a good deal of exercise.

You write to a supplier, for example, with whom you have done business for many years, asking him to accept your order for this or that because if you do not get the goods you will have to disappoint some of your own long time customers, or perhaps even curtail your operations.

Back comes a three hundred word letter to you couched in the most diplomatic and friendly phraseology of which its writer is capable. But it all adds up to a two letter word, "No." And that makes you feel bad.

How do you think it makes the supplier feel to have to write you a letter of that sort? Just as bad as it makes you feel to get it.

After spending years and years of intensive effort in developing and building a business by painstakingly constructing customer goodwill, no sane businessman wants to see these channels run dry, even though his capacity is flooded by a defense deluge.

So when a supplier of steel or other materials or products with whom you have done business tells you that he must refuse an order, or that he cannot expedite a shipment, believe me, he is doing it from compulsion and not from pleasure. And you should feel sorry for him rather than get mad at him.

The situation almost parallels that of a girl who has been accepting the attentions of a boy and who suddenly declines an invitation to go out with him. If it is because she has turned against him, or prefers some other fellow to him, then he has a right to be sore. But if the reason is that Papa says she must go to Sunday school at the time the boy wants to take her to a show, he should not blame her for it. The responsibility lies with Papa who has the authority and is exercising it.

Today, Uncle Sam has virtually commandeered the services of industry for the defense program. He does not need a property seizure bill when he has the priority power. An A-1 will steal a machine tool or a thousand tons of steel that you have on order from under your nose as quick as "scat." And a B-1 priority will do you no good as long as your supplier gets more A-1's before your B-1 is shipped you.

When you are after things that are hard to get, try by all means to get them. But if you meet a "no" here and there, remember that the man who says it may be a better friend of yours than another man who says "yes" because he does not have to say "no."

*J. W. VanDusen*

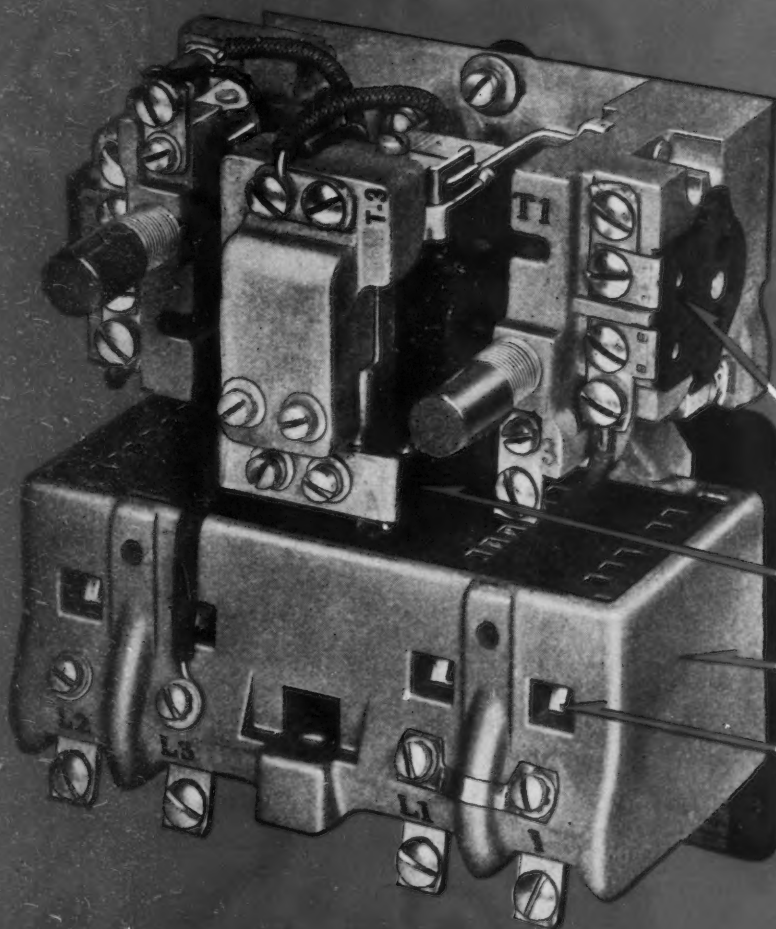
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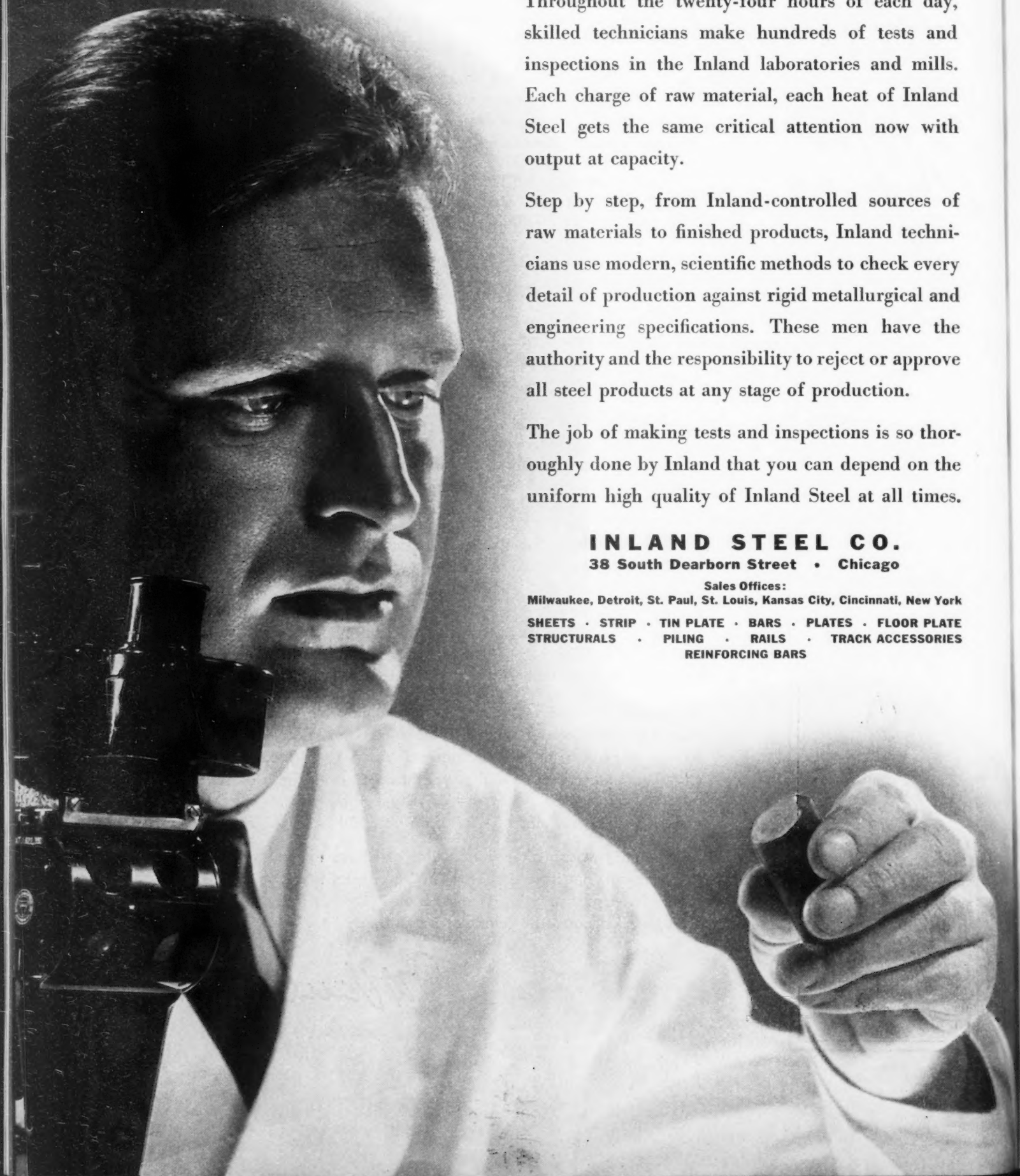
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# Magnesium Sand Castings

By N. M. BRISKIN  
*Laboratory Control,  
Magnesium Foundry,  
Ford Motor Co.,  
Detroit*

DUE to the fact that magnesium foundry practice is still in its infancy, there is much conflict of opinion as to best practice, and literature on work done in this country is still comparatively scarce. This article attempts to make a brief survey of literature published in both the United States and abroad, and to contribute some facts which the writer has obtained through his own experience. However, the reader must bear in mind that although proper reference to published literature is made, many of the opinions expressed here are only the author's personal views on the subject and do not necessarily coincide with the accepted practice of any commercial magnesium foundry.

ALTHOUGH magnesium was isolated as early as 1808 by the English chemist, Sir Humphrey Davy, it remained little more than a laboratory curiosity for over 100 years because of commercial difficulties in obtaining it from nature. The magnesium industry did not begin in this country until 1915. And, only in very recent years has the tonnage produced been sufficient to reduce the cost to the point where it can compete with other metals as an engineering material.

The outstanding property which makes magnesium desirable for many uses is its extreme lightness. The specific gravity of the metal in the pure state is 1.74 and of the common alloys about 1.80. This makes it two-thirds the weight of aluminum and less than one-fourth the weight of iron and steel. The high strength-weight ratio of magnesium combined with toughness makes it useful for a great variety of purposes. Furthermore, magnesium is extremely easy to machine, which is another desirable feature. The addition of other ele-

ments to make alloys improves the physical properties of the pure metal and makes it susceptible to heat treatment and age-hardening.

The lightness of magnesium alloys immediately suggests the field of aircraft construction. In addition to this field, however, are those of machinery and vehicle construction and also any others where it is desirable to increase the power-weight ratio. Magnesium alloys are finding increased use in portable machinery and even in deep sea diving apparatus.

Much publicity has been connected with the inflammability of magnesium alloys, and the dangers involved in their manufacture are not to be minimized. It must be remembered, however, that in the massive form these alloys will not burn and cannot be ignited below their melting point,<sup>3</sup> which is approximately 1130 deg. F. If intense heat is applied, however, the metal will easily melt locally in a very small area around the concentrated heat. But only after melting will magnesium support its own combustion, because in the solid

state heat is carried away too rapidly from any one section.

Magnesium alloy chips and dust, however, are extremely inflammable, and can be ignited by a flame or a spark. Due to the small dimensions of the individual chip, the heat cannot be conducted away, as in the case of larger pieces. For this reason it is necessary to take precautions against sparks during machining, cutting and any other operation where magnesium chips, filings, or dusts are produced.

Magnesium forms alloys with most of the common metals, yielding products with a wide range of properties. The composition of most of these alloys may be divided into two general groups: First, those having only one alloying addition—usually aluminum (10 to 12 per cent) or zinc (5 to 6 per cent). Second, the group with two or more alloying additions; these additions usually include aluminum and zinc in varying proportions with other metals such as manganese, and sometimes copper, lead, cerium, or silver.

A typical alloy in wide use for

sand castings has the following composition: 6.00 per cent Al, 3.00 per cent Zn, 0.20 per cent Mn, and balance Mg. This alloy is marketed under a variety of trade names and specification numbers, both in the United States and in Europe. The Society of Automotive Engineers has designated this alloy as magnesium alloy S.A.E. No. 50.

The S.A.E. No. 50 alloy will have approximately the following physical properties:<sup>2</sup>

	Tensile Strength Lb. per Sq. In.	Yield Strength Lb. per Sq. In.	Elongation in 2 In.	Brinell Hardness
As cast	27,000	12,000	5%	50
Heat treated and aged	36,000	16,000	9%	62
Heat treated	40,000	20,000	1%	65

These properties will vary somewhat with the method and time duration of heat treating, but the values shown are typical.

Alloys of magnesium have many physical properties equal to or better than those of aluminum alloys, and are inferior to aluminum alloys only in respect to hardness and compressive strength.

Magnesium alloys, however, are susceptible to edge stresses and notch effects; that is, sharp corners and irregularities of the surface may easily be spots for fatigue cracks to start. For this reason, care must be taken in design to put adequate fillets on all corners and provide a good surface finish to the casting.

The outstanding characteristic of magnesium is its strong affinity for oxygen at elevated temperatures. This is responsible for much of the difficulty in the reduction, melting, forging, and casting of magnesium alloys. Magnesium combines with atmospheric oxygen at about 650 deg. C. (1202 deg. F.),<sup>5</sup> and produces sufficient heat to form nitrides of magnesium with atmospheric nitrogen above 670 deg. C. (1238 deg. F.). Magnesium is attacked by most acids with the curious exception of hydrofluoric. It is relatively resistant to ordinary dry atmosphere and alkalies but fails easily in salt spray corrosion tests. Certain of the alloys, however, resist salt water corrosion more than others. A pickling solution of nitric and chromic acid gives magnesium a corrosion resistant surface. Salt spray will penetrate this coating in time, however.

As molten magnesium on exposure to air rapidly forms oxides and nitrides of almost the same specific gravity as the metal itself, these

become disseminated through the bath and contaminate the metal. For obvious reasons, melting in vacuum or under inert gases is not commercially practical. Therefore, some type of flux must be used which will act as a solvent for these oxides and nitrides. The base for the greatest majority of fluxes in use today is magnesium-chloride. Other compounds are usually added, both to raise the melting point and sometimes to act as a cleansing

agent. Magnesium oxide is occasionally added for the former effect and calcium or other fluorides for the latter.

### Foundry Practice

The melting of magnesium alloys is usually done in oil or gas-fired furnaces. The ideal type of furnace for melting magnesium is the high-frequency induction furnace. The eddy currents produced in the metal by this method causes an automatic mixing of the alloy and prevents possible segregation. This mixing action also distributes the flux throughout the metal, cleansing it and depositing the impurities on the bottom and side-walls of the crucible. Furthermore, this method allows rapid melting and the accurate control of temperature so important in magnesium casting. It also decreases the risk of burning and the resulting oxide. This oxide not only means a waste of metal by burning but also may enter the casting as an inclusion. The economic feasibility of this method, however, remains to be proved in magnesium melting.

Open pot melting is used mainly for remelting of magnesium scrap consisting of chips and turnings. It is also used to a limited extent in the manufacture of small permanent mold castings. This process consists of melting the scrap or prepared alloy in a large steel pot. A large amount (about 10 per cent) of a very fluid flux is used to form a thin protecting film on top and a pool beneath the metal. In the manufacture of small permanent mold castings by this process, the metal is dipped from the pot with hand ladles.

This method of melting is objectionable for sand castings for sev-

eral reasons. First, when the metal is dipped out with hand ladles, the protecting layer of molten flux must be broken. This causes excessive burning of the metal surface. Furthermore, dipping ladles can contain only small quantities of metal and cool rapidly, making accurate temperature control difficult. Exposing too much surface of magnesium to the air causes excessive oxide and nitride formation.

The crucible process consists of melting the prepared alloy in a steel crucible, rather than in a pot, and when the metal is poured, the entire crucible is taken from the furnace setting and carried directly to the mold. This eliminates excessive oxidation by reducing the amount of metal surface exposed to the air. The crucible process is almost universally employed in the manufacture of sand castings. Some larger foundries use large melting furnaces (as large as 2000 lb.) to get the metal into the molten state and then pour from these melting furnaces into the smaller superheating crucibles, each with its own furnace setting. The mold is poured from these smaller crucibles after the metal is superheated and cooled to the pouring temperature.

Flux is dusted on the bottom and side walls of the crucible and over the charge of metal. The molten surface is kept covered with a skin of the flux until the entire charge is melted, when the temperature is raised to insure complete fusion of the flux. Stirring with an L-shaped rod then brings all the metal in contact with the flux, which dissolves all entrained oxides and nitrides and sinks to the bottom of the crucible. This dross is removed and more flux is added to cover the entire surface of the metal. Care must be taken not to add flux too soon before pouring and to allow it to remain on the metal long enough to dry thoroughly. The total amount of flux used will be approximately 1 per cent of the weight of the charge.

Although pouring practice in some foundries consists of holding back the flux in the crucible while pouring,<sup>5</sup> common practice in this country is to first skim off the flux entirely and then dust on a mixture of equal parts of sulphur and boric acid. The sulphur in this mixture protects the metal from the oxygen in the air and the boric acid prevents any moisture from reacting with the molten magnesium. This mixture is advisable because, while



protecting the metal it volatilizes and eliminates the danger of flux inclusions in the casting.

Of the many deoxidizers that have been proposed for magnesium alloys, calcium is undoubtedly the best. When added to the extent of 0.5 per cent, the alloys are quite free from nitrogen and oxygen, with both of which calcium has a very strong affinity. Calcium seems to have a very beneficial influence in providing an exceptionally clean surface to castings, especially when insufficient protective sand-addition agents are present. In heat treating, slightly higher temperatures may be necessary in order to obtain the same ductility in cases where more than 0.3 per cent calcium has been used as a deoxidizer.

Calcium metal is supplied in refined slabs and is added to the crucible of magnesium just before pouring by immersing a small weighed cube on the end of a steel wire. The wire is removed as soon as the calcium dissolves.

In melting magnesium alloys it is necessary to superheat the metal about 450 deg. F. above the melting point in order to obtain fine grain structure. For S.A.E. No. 50 repeated experiments at various temperatures have shown that finest grain structure is obtained when the metal is superheated to 1600 deg. F. and then cooled to the pouring temperature, which varies from 1420 deg. to 1520 deg. F. depending on the size of casting and thickness of wall section. Fracture samples taken at 1600 deg. F. before pouring will give some indication of the final grain structure. A coarse-grained fracture indicates that the metal should be held longer at the superheated temperature.

Most magnesium alloys melt at approximately 1130 deg. F. But at the melting point, and up to about 1400 deg. F., magnesium has very low fluidity. Furthermore, magnesium forms a viscous oxide film over its surface which also limits its fluidity. Consequently, the metal must be poured at a temperature sufficiently above the melting point in order to obtain the fluidity necessary. Superheating or pouring at too high a temperature, however, increases the risk of burning and the resulting oxides and nitrides formed.

These oxide films which form at higher temperatures may be washed into the mold at the beginning of a pour and remain in the down-

FIG. 1—Micro-shrinkage even close to a heavy boss, due to insufficient fluidity of the metal. Poured too cold, at 1390 deg. F. Note concentric formation of defect at the base of the boss which was adequately fed by a large riser and chilled on bottom. Pouring above 1475 deg. F. increased fluidity of the metal and this defect was eliminated.

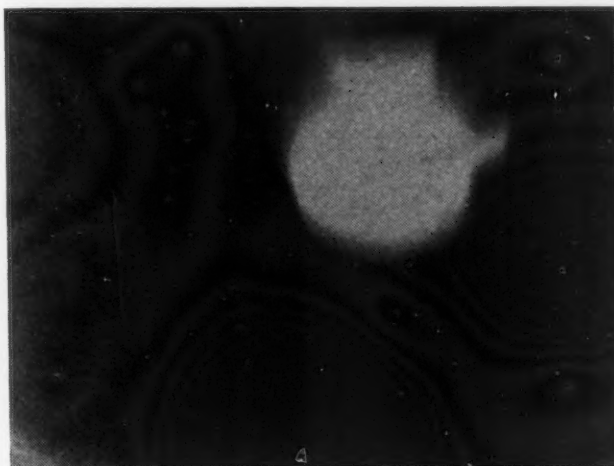


sprue or gate, restricting the flow of clean metal. The effect of this restriction may be sufficient to cause misruns. Casual consideration may place the blame for these misruns on cold metal, when actually, in these cases, the metal was overheated.

#### Molding and Coremaking

As molten magnesium readily decomposes water, a magnesium alloy poured into an ordinary green sand mold will be ejected with a force almost amounting to an explosion, due to the great volume of hydrogen liberated from the moisture. For many years perfectly dried sand molds were used for magnesium castings, but without marked success. Prolonged drying will drive off moisture from sand, but the water of hydration of the clay bond still remains. Driving off this combined water by drying at higher temperatures would destroy the bond and the mold would crumble. It was these difficulties that hindered the development of magnesium in the sand cast form for many years.

FIG. 2—X-ray shows mottled appearance due to the fact that the casting was fed too slowly with metal. This view is similar to Fig. 1 but deals with a heavier section. The trouble was eliminated by the use of larger runner, gates and risers to wash more metal through the casting. The pouring temperature was 1500 deg. F.



Even moisture from air filling the pores of the mold will react with molten magnesium. Filling the mold with a gas such as hydrogen, carbon dioxide, or sulphur dioxide, all more or less inert to magnesium, does not keep the steam from the mold from coming in contact with the metal. Various volatile materials were tried with varied degrees of success. Among these were pitch, naphthalene, and volatile organic salts such as ammonium-oxalate. It was finally found necessary to add some agent to the sand that would surround each grain of molding sand with a complete surface of some substance inert to magnesium, preferably with a strong affinity for oxygen and water, and of such a nature that while freely penetrating the pores of the mold it would not readily escape. The desired properties were found in a mixture of sulphur and boric acid. The proportions of this mixture and the amount used varies in different foundries. Excellent results are now being obtained with the addition of a mixture of 2 per cent of each to the sand.

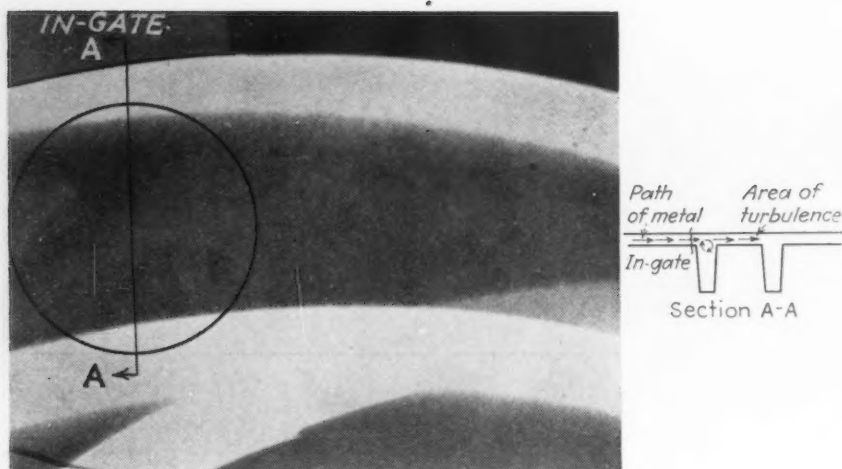


FIG. 3—Micro-shrinkage due to turbulence of the metal in casting. The turbulence in front of the gate (in circle) was due to the flow of metal across the rib.

Other compounds, such as fluorides and fluosilicates which liberate hydrofluoric acid when in contact with hot metal have been tried as sand addition agents and are now in current use in many foundries in this country and in Europe, particularly in Russia. Since hydrofluoric acid gives off extremely acid fumes which are toxic in nature, attempts have been made to eliminate the use of fluorides and fluosilicates entirely by the use of only sulphur and boric acid, with decided success.

When molten metal is poured into the mold it instantly vaporizes the powdered sulphur in the surface layer of sand, forming a protecting layer of vapor between the metal and the moisture in the sand. Any air present combines with the sulphur vapor to form  $SO_2$ . This vapor is sufficiently fluid to penetrate the pores of the mold and surround each grain of sand, but being heavy does not easily escape and is con-

stantly replenished by the gradual vaporization of sulphur deeper in the sand as the heat penetrates the mold. As the casting cools off most of the vapor condenses in the sand, so there is little loss of sulphur.

Boric acid upon heating gives off water to form volatile boron-trioxide, the acid anhydride, which condenses as a hygroscopic, glassy solid. The vapors of boron-trioxide formed in the mold act similar to those of sulphur except that, instead of reacting with the oxygen from the air, they react with the steam and water vapor in the pores of the mold.

#### Defects

Although there are several other troublesome types of defects found in magnesium castings, by far the greatest cause for rejections is that of shrinkage. Therefore, it is imperative that ample gates and risers are provided. In some cases the weight of the gates and risers

necessary may be three to four times the weight of the clean casting.

As in the case of other metals, shrinkage arises (a) in the liquid condition, (b) during solidification, and (c) in the solid state. In homogeneous alloys composed entirely of solid solution, contraction is only external. But in eutectiferous alloys, where there are other elements and compounds precipitated in the grain boundaries, there is, in addition, an internal shrinkage due to the eutectic. These intergranular shrinkage voids are generally referred to as "micro-shrinkage." To the naked eye an area of this micro-shrinkage has no different appearance in fracture than that of a perfectly sound casting, except in extreme cases when a faint yellow discoloration in the fracture may be visible. Microscopic examination of this area, however, will show actual voids in the grain boundaries (see Fig. 6) and carefully taken radiographs will show a dark area of lower density than the surrounding solid metal. This micro-shrinkage has a definite harmful effect on the physical properties and fatigue life of the casting and should be eliminated in areas susceptible to stress or fatigue by the use of proper gates, risers, and chills. This defect occurs often in certain intricate thin-walled castings that are difficult to feed properly. In thin sections that must withstand pressure this type of porosity will cause leakage.

Among other metals, if the fluidity of the molten metal is sufficient to prevent misruns, the casting will be quite satisfactory in structure and physical properties. This is not necessarily the case in the manufacture of magnesium castings. Although the metal may be fluid enough to fill all sections of a mold, very often X-rays and photomicrographs will show porous areas of micro shrinkage.

These porous areas appear in X-ray in two separate but related forms. The first form shows up in X-ray in a scattered, mottled appearance of dark spots and may be caused by unsound filling of the mold due to a lack of fluidity in the metal or insufficient risers. The cause may be that the metal was too cold to give the necessary fluidity or that it was constricted in small gates and cooled before the microscopic constituents were uniformly diffused throughout the metal. In either case the result is the same—the intermetallic compounds and

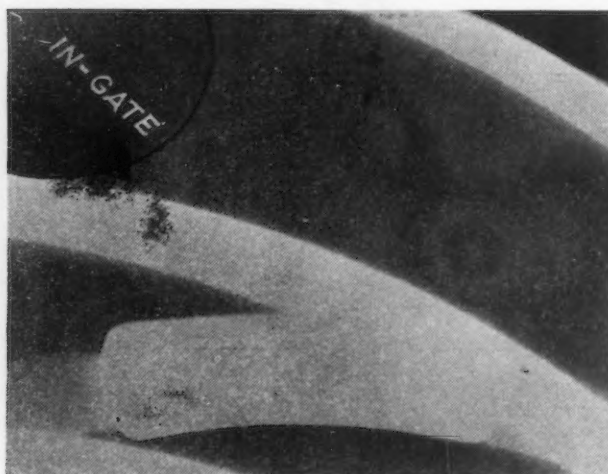


FIG. 4—The turbulence shown in Fig. 3 was eliminated by gating the metal into a thin section between the two ribs.



eutectic in the grain boundaries solidifies less rapidly than the surrounding grains of pure magnesium, shrinking and leaving voids in the boundaries. Insufficient or improperly placed gates, risers and chills will cause this type of defect. The casting does not necessarily have to show "shrinks," "cold shut," or "misrun" spots on the surface to have this type of micro-shrinkage. Whenever insufficient metal of the proper fluidity passes through the mold this type of porosity will result. Fig. 1 and 2 show this micro-shrinkage of the first type in X-ray prints.

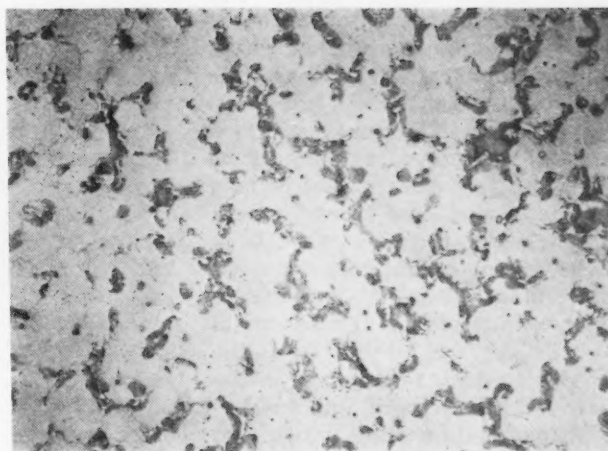
The second form of microscopic porosity is caused by turbulence or unquiet filling of the mold due to the shape of some particular spot in a casting or gate. This type of defect usually shows up near an improperly designed in-gate, near a sharp corner, in a thin section at the base of a heavy riser, or in thin areas between heavy ones. In X-ray this porosity due to turbulence appears in more concentrated clouded areas as compared to the scattered mottled appearance which the first type of porosity shows. Fig. 3 shows this type of micro-shrinkage due to an improperly designed in-gate. Fig. 4 illustrates the new type of in-gate and how the prevention of turbulence eliminated this type of defect.

Micro-shrinkage in small castings, consisting chiefly of thin, flat walls not over  $\frac{1}{4}$  in. to  $\frac{3}{8}$  in. thick, can be detected quite readily by X-ray. In fact, under these conditions, the X-ray is so sensitive that considerable judgment must be exercised to prevent rejection of perfectly serviceable castings which, on breakdown test, will support loads several times those required by stress analysis. Care must be taken, however, in the use of casting with microscopic porosity that areas subject to fatigue stresses are perfectly sound, due to the susceptibility of these alloys to fatigue failure.

Another troublesome defect in magnesium castings is that of inclusions. This is usually surface oxidation which is washed into the body of the casting. If proper care is taken in skimming, no flux will be found as an inclusion.

When the mold is poured, the clean metal flows through a flexible tube of oxide which then remains as a thin film between the metal and mold surface. If any of this oxide film is broken it will be washed into the casting and will appear as a

FIG. 5—Magnesium alloy S.A.E. No. 50 as cast, shown here at 100 diameters. The metal is of uniform density. There are inter-metallic compounds of Al-Zn-Mg in boundaries between grains of pure magnesium.



thin brown flake just below the surface of the casting. Tensile tests have shown that this oxide has a harmful effect on physical properties, especially when found in small cross-sections. Screens, traps, and steel-wool filters placed in the down-sprue are being used in some foundries to keep oxide from entering the mold with the metal. These devices can often be eliminated if the runner-box is quickly filled. This prevents excessive oxide formation. Properly placed gates, in correct proportion and size will also help prevent oxide from entering the mold.

Oxide formation due to burning of the metal after it has entered the mold cavity can be eliminated by: (a) control of sand-addition agents, (b) use of calcium before pouring, (c) making certain that any flame on burning metal in the crucible is extinguished before pouring, by the use of sulphur-boric acid dusting agent.

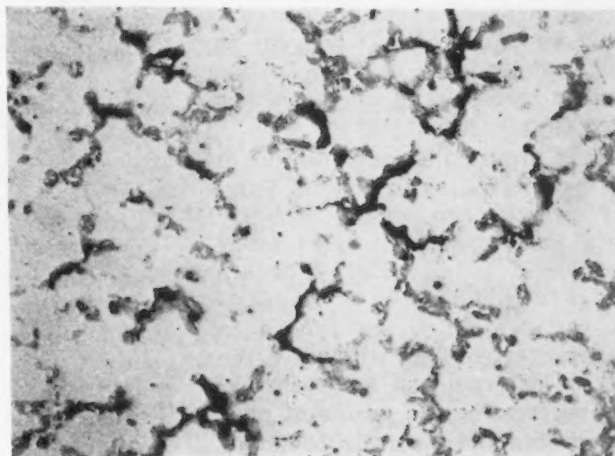
Proper gating is one of the greatest problems the foundryman has to face in making magnesium castings. Theories of gating used in

ferrous metals can seldom be directly applied because of the peculiar properties of magnesium alloys:

*First*, because of its low specific gravity and lightness, dirt and sand will not float on molten magnesium as it will on iron or steel. Therefore, extreme cleanliness of the mold, runner box, and metal itself, must be maintained to keep dirt from entering the casting. The use of numerous thin gates instead of a few heavy ones will help to keep the metal in the casting clean. However, gates which are too thin may cause micro-shrinkage due to "choking effect" or turbulence. Whenever possible magnesium castings should be gated at the bottom, tranquil filling of the mold being most important. Also, it is more advisable to use several thin down-sprues, rather than one large one, and place these close together under the same runner box. This practice permits rapid filling of the down-sprues, avoids sucking air or oxide down into the mold, and completely isolates the metal in the mold cavity from the atmosphere.

*Second*, because of the low spe-

FIG. 6—Micro-shrinkage in S.A.E. alloy No. 50. The cracks and voids of microscopic dimensions (black areas) between grain boundaries are due to shrinkage of the eutectic. At 100 diameters.



cific heat and low latent heat of fusion, castings of magnesium solidify very rapidly. Hence the need for numerous risers and gates. In ferrous metals risers perform a three-fold purpose: (a) they act as reservoirs for excess metal to help fill the mold; (b) they remain molten longer than the main body of the casting and so help draw out gases and dissolved impurities which tend to stay in the last metal to solidify; (c) they feed the shrinkage which takes place in the casting through the liquid, solidification and solid cooling periods. In magnesium, however, this change from liquid to solid is so rapid that the actual amount of feeding, unless very close to the riser, is almost negligible. The riser in magnesium foundry practice is primarily a reservoir for excess metal. In filling the mold sufficient metal must be "washed" through the mold cavity from all directions and up into these reservoirs to insure equal distribution immediately. The rate of solidification is so great that the metal has no time (or weight necessary) to feed back from the risers into the casting. Many times shrinkage will occur within an inch from a riser (see Fig. 1). Making risers larger will allow more metal to be "washed" through the casting, but large risers in magnesium will not stay molten much longer than small ones, as they do in steel. The high heat conductivity of magnesium (approximately  $1\frac{1}{4}$  times that of iron) cools the risers rapidly. This fact, coupled with the lack of weight to feed the metal downward and the natural sluggishness of magnesium alloys in the molten state makes risers useful only as "reservoirs" in magnesium casting. An easily observed manifestation of this lack of feeding is the almost level top of the risers on magnesium castings after solidification, as compared to the deep hollow cone in those of steel. This happens in spite of the fact that the actual casting shrinkage of magnesium is even greater than that of steel.

Cast iron chills are useful in heavy sections, as in general foundry practice, to rapidly solidify metal in these sections and prevent shrinkage. In addition, chills are useful in thin sections of magnesium castings which are difficult to feed properly. This eliminates the risk of external and micro-shrinkage by freezing the grains of pure magnesium and the grain boundary

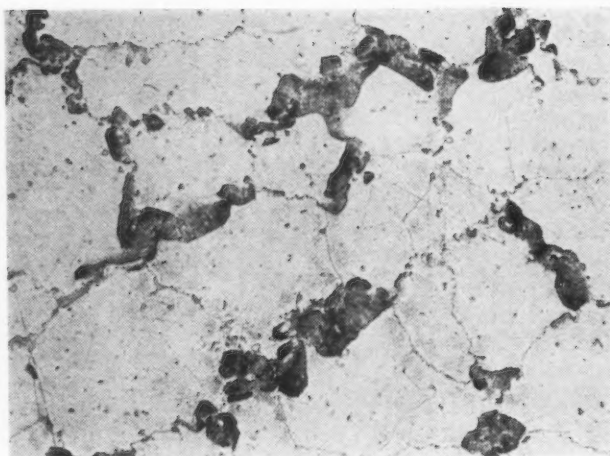


FIG. 7—Effect of heat treatment in S.A.E. alloy No. 50. This is a solution treatment—12 hr. at 715 to 730 deg. F. Although most of the boundary constituent has been dissolved in the solid solution (light area) some undissolved phase still remains (dark areas). At 100 diameters.

constituents at the same time. Some suitable surface coating should be used on chills to prevent moisture from condensing on them and to prevent the metal from "kicking" off the surface of the chill. Soot from an acetylene flame is ideal for this purpose. Large chills should have vents drilled through them to allow escape of gases, thereby preventing surface blowholes.

Aluminum and zinc, the additions usually made, are much more soluble in magnesium at elevated temperatures than at room temperature. It is this fact which makes magnesium alloys susceptible to heat treatment. The properties of the alloys may be changed by controlling the quantities of solid solution and constituents precipitated into grain boundaries. In the case of aluminum, the solubility increases from 5 per cent at atmospheric temperatures to about 13 per cent at the eutectic temperature of 800 deg. F. For zinc, the solubility increases from just under 2 per cent at room temperature to about 6.5 per cent at the eutectic temperature (618 deg. F.). Since the percentage composition of the common magnesium alloy additions is below these maximum amounts it is evident that, by heating to just above the solubility limit, these constituents can be completely taken into solution in the magnesium. The time required for this, however, is too great for commercial practice. It is, therefore, necessary to compromise and dissolve only part of the grain boundary constituent. On quenching, or preferably, on air-cooling, the alloy will consist of polygonal grains of the solid solution with excess of the second constituent which has remained undissolved during the limited heat treatment. When, during the pre-

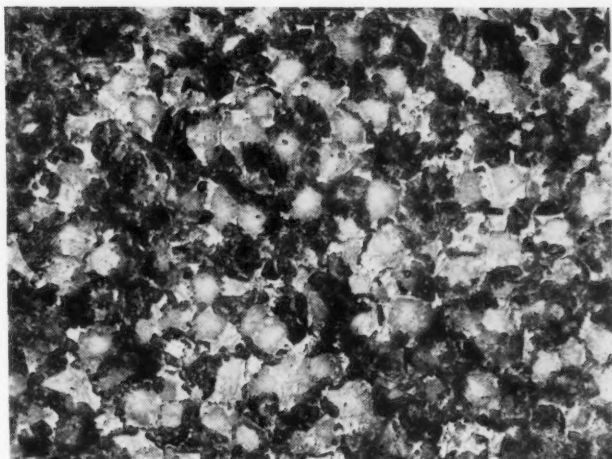
cipitation heat treatment, the dissolved constituent is precipitated out of solution, the alloys will contain three phases, namely the saturated solid solution, the precipitated phase, and the undissolved constituent. A more dispersed structure, if desired, can be secured by increasing the soaking time during the solution treatment. Complete solution of aluminum and zinc would require about 50 hr., but nearly all the improvements sought by heat treatment can be obtained in 18 to 24 hr.

In all heat treating of magnesium alloys, accurate temperature control is essential, as melting of the eutectic must be avoided. As long as there is no melting of the eutectic, heat treatment will have no effect on micro-shrinkage between the grain boundaries of the alloy. Electric furnaces with automatically controlled temperatures are commonly employed. Plain nitrate baths, as used for heat treating aluminum alloys cannot be used owing to the danger of burning. For temperatures below 750 deg. F. no special atmosphere is necessary, but above this,  $SO_2$  must be used to avoid burning of the castings.

The heat treatment given consists of heating to the solution temperature, which varies from 630 deg. F. to 810 deg. F., depending on the alloy composition, holding for about 12 hr., and then air cooling. For S.A.E. No. 50, a temperature of 725 deg. F. is used. This solution treatment increases the ductility of the alloy. If more strength and hardness is desired, at a sacrifice of ductility, a second "aging" or precipitation treatment is given, which consists of heating to 350 deg. F. for 16 hr. The table presented early in this article gives



FIG. 8—Alloy No. 50, heat treated and aged. The solution treatment indicated in Fig. 7 has been followed by precipitation or artificial aging at 350 deg. F. for 16 hr. Large grains of solid solution have precipitated the less soluble eutectic. In addition, solid solution and undissolved phase is also present.



a comparison of the physical properties of a typical alloy before and after heat treatment.

From the foregoing considerations it is evident that the manufacture of good sand castings of magnesium requires constant care and the best of foundry technique. The necessity for continuous and vigilant laboratory control in their manufacture cannot be over-emphasized.

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## Metallic Calcium for Refining Scrap Aluminum

ALMOST all aluminum scrap contains other metals introduced at the time of preparing aluminum alloys, some of which can be eliminated with metallic calcium by the smelter of secondary aluminum. Tin, bismuth, silicon, antimony, lead and other alloying metals have an affinity for calcium, and these "impurities" are eliminated as cal-

cium compounds in entering the slag when metallic calcium is used in reconditioning scrap.

The great demand for aluminum is causing every kind of scrap to be collected for remelting, even scrap that heretofore was not considered worthwhile because of its combinations of alloying metals. The amount of metallic calcium re-

quired in reconditioning scrap aluminum is comparatively small, and its use economical.

A new domestic plant to produce calcium has been erected by Charles Hardy, Inc., New York, and will eliminate some of the difficulty of obtaining metallic calcium from Europe, formerly the sole source of supply for this product.

# High-Silicon Acid-Resisting Castings

IT is generally known to the chemical industry that an alloy having the following analysis is very high in acid-resisting quality: silicon, 14.5 to 16; sulphur, 0.004 to 0.02; phosphorus, 0.10 to 0.90; manganese, 0.30 to 0.65; and carbon, 0.10 to 0.80 per cent. While the metal has very high acid-resisting qualities, it is of a friable nature, and will not stand any direct blow or shock. Also its performance against thermal shock is somewhat variable.

It is universally understood by the foundry trade that the successful manufacture of castings to this analysis is both a very hazardous and skilled operation. The methods followed are in many cases totally different from those usually adopted in iron, steel and non-ferrous metal founding. While much of the following matter might be thought to be unorthodox, practice has proved beyond doubt, so far as the manufacture of this material is concerned, that the methods described are the most successful, according to a recent article in *Foundry Trade Journal*.

### Melting

The metal can be melted in any of the following types of furnace: electric, oil, or pulverized fuel fired rotary furnaces, open hearth, crucible or cupola. Continental practice has favored the use of the rotary or the open hearth furnace, while American practice has relied upon either the electric or the rotary furnace. For various reasons, the practice in England up to the last few months has been to melt in the cupola and the crucible furnace.

In the writer's opinion, the best method of melting is with an electric furnace; the most economical is with the cupola, and this article will deal with metal so melted. To melt in this manner, ferro-silicon has to be mixed with cast iron scrap in the proportions of 2 of cast iron scrap to 1 of 45 per cent

By FRANK MARSDEN

Managing Director, Joseph Stubbs, Ltd.,  
England

o o o

ferro-silicon. The usual charges are 600 lb., made up of 400 lb. cast iron scrap and 200 lb. of 45 per cent ferro-silicon, plus 10 lb. of fluor-spar or limestone.

The bed of the cupola is made to the usual height and the mixture charged in a similar manner as used in gray iron melting practice. The melting conditions are similar, with the exception that the coke consumption is higher. The material in melting has a tendency to "grow" on the sides of the cupola, and unless the cupola is kept very clean "arching over" is prevalent.

Special attention has to be paid to the construction of the tapping hole. The diameter of the tapping hole at the top should not be more than  $\frac{3}{4}$  in. If these instructions are carried out and the tuyeres are kept clean, silicon iron will be successfully melted.

The metal, when melted, should be tapped out into a ladle and poured into ingots or pigs. When the ingots are broken up, it will be noticed that there is considerable variation in the granular structure, proving that the metal is not thoroughly homogeneous, and until the metal has been melted at least three times it is not safe to use it for castings. This applies to melting in all types of furnaces where the mixing of any quantity of this metal takes place.

### Molding

The majority of work is made by the dry sand method, only very small plain unmachined castings being cast in green sand. All pipes, cylinders, etc., are cast vertically with the runners at the top. All top flanges should have at least a

3-in. header cast on them to ensure clean and solid faces after the header is cut off.

In casting pans, vessels, etc., these are always cast with the base upwards. They are run through a series of pencil runners spread over the face of the casting. Owing to the excessive shrinkage of the metal, it has a tendency to segregate at the center, especially where the section changes, say where a flange joins the main body of a pipe or vessel, etc. To prevent this segregation occurring, recourse to chilling has to be made. A series of heavy chills placed at the points where the draw takes place will solidify the casting and a sound result is obtainable. Owing to the tendency of the metal to develop blow or gas holes, special attention must be paid to the drying of molds and cores. Skin drying of molds will produce most disastrous results.

### Core Making

Great care and attention must be paid to the core irons and core barrels. All core grids for pans, vessels, bends, pipes, etc., must be constructed with a center bar or ring strong enough to carry the core, but have lightly constructed fins or fingers radiating from the center bar or ring. At least 2 in. clearance should be allowed between the end of the finger and the side of the core box. The reason for this construction is to simplify the stripping of the casting before annealing.

All core barrels should be straight and smooth with ample holes drilled or cast in to allow free escape of air while the cores are being dried. About 2 in. or 3 in. from each end of the core barrel, holes should be drilled or cast large enough, according to the size of barrel, to allow it to be withdrawn from the casting immediately it is set.

(CONTINUED ON PAGE 120)



# Inspection of Ordnance Material

By P. C. CUNNICK

Materials Engineer, Rock Island Arsenal,  
Rock Island, Ill.

*—The method of procurement and procedure whereby materials are checked for armament manufacture are set forth in detail herein.*

**P**ROUREMENT during the first World War was one of the big problems to be overcome in equipping the Army. As a result, immediately following the close of that war, steps were taken to eliminate a repetition of such a condition. While there has been a vast improvement in the system, procurement still has its many pitfalls—pitfalls which are all too frequently being brought to light by the present day preparedness program.

Immediately following the first World War, steps were taken to systematize a procedure which might more successfully obtain the material needed by a vast army of men such as the present Army lay-out demands.

It may or may not be known that the United States, for this purpose, is divided into procurement districts. Fig. 1 shows which states fall within these districts and in which cities the district offices are located. It will be noted that the further east, the fewer are the states allotted to each district. This division is not based upon geographical locations but concentration of manufacturing establishments.

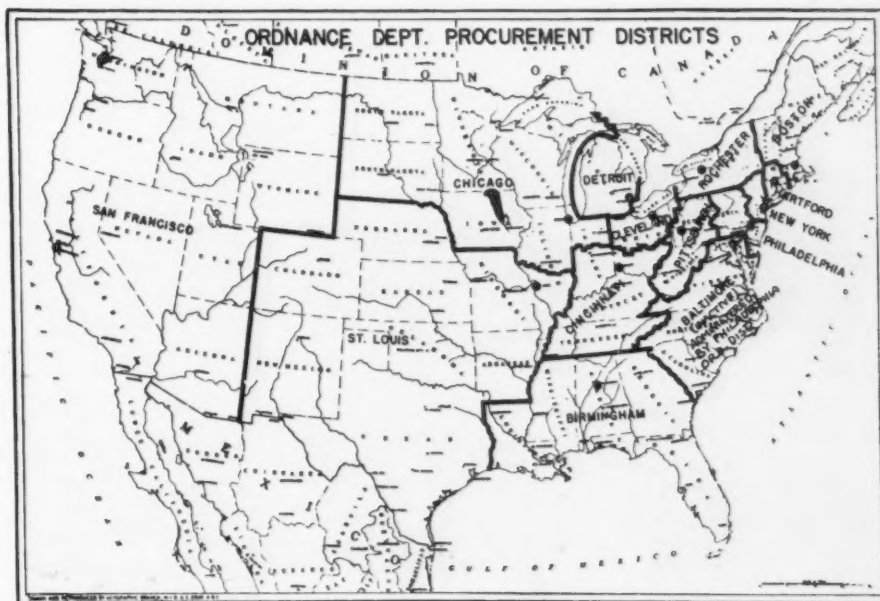
These procurement offices, in peace or time of little activity, are

manned by a district chief, assistant district chief, and an executive officer. The first two named may or may not hold commissions in the reserve corps, but the third named officer is always an officer of the regular army, usually holding a rank as captain or higher.

While the district chief and his

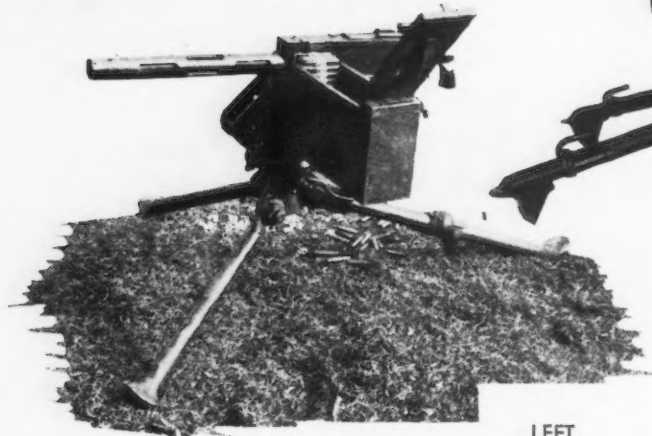
assistant may or may not devote a great deal of time to the duties of the office, it is the duty of the executive officer to visit the various manufacturing plants throughout the district and, if possible, determine what the facilities of each plant would most economically produce in case of an emergency. Not

**FIG. 1**—Location of head office and area covered by the various ordnance procurement districts.





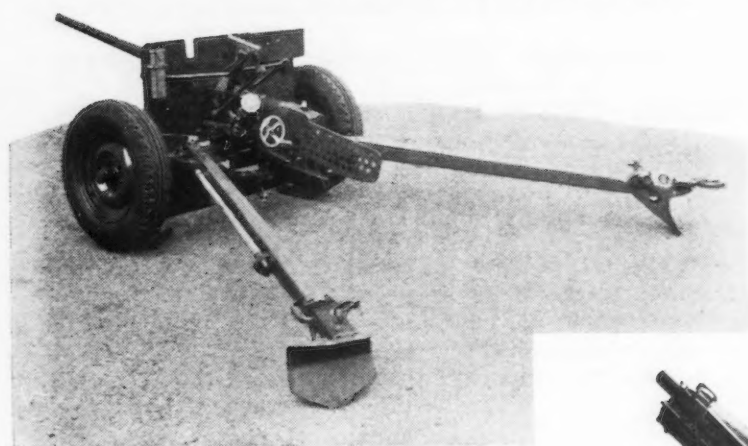
LEFT  
FIG. 2—Caliber .30 rifle  
used by U. S. infantry.



ABOVE  
FIG. 3—Tripod and  
caliber .30 machine  
gun. The latch for slid-  
ing sleeve has been  
changed to bottom side  
of leg. Cam type pin-  
tle lock release.

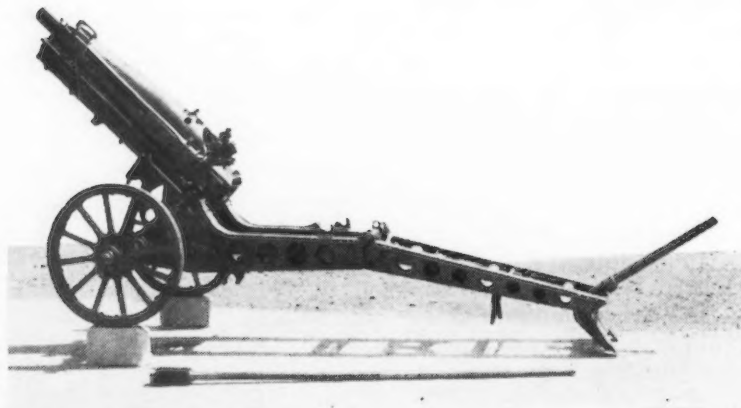


ABOVE  
FIG. 4—Tripod mount and caliber  
.30 anti-aircraft machine gun.  
Shown at right side, maximum eleva-  
tion.

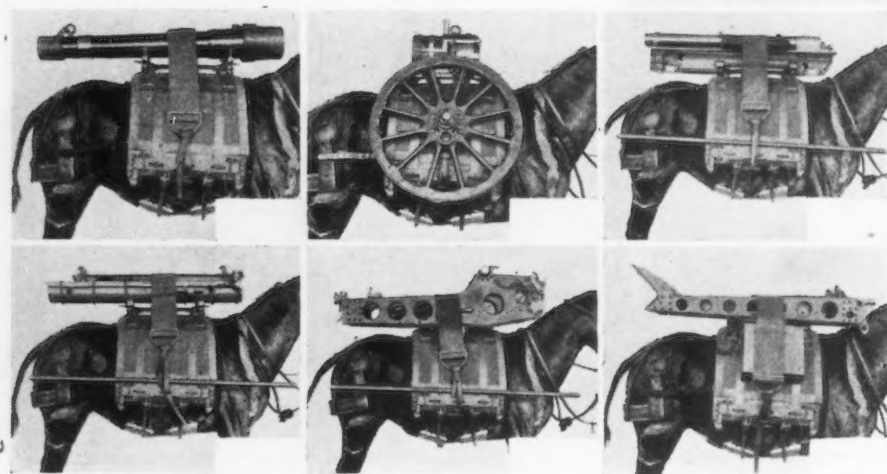


LEFT  
FIG. 5—Metallic link belt, caliber  
.30 Browning machine gun.

ABOVE  
FIG. 6—37 mm. gun and carriage, in  
firing position. This view shows the  
breech end, with gun at maximum eleva-  
tion.



ABOVE  
FIG. 7—75 mm. pack howit-  
zer and carriage.



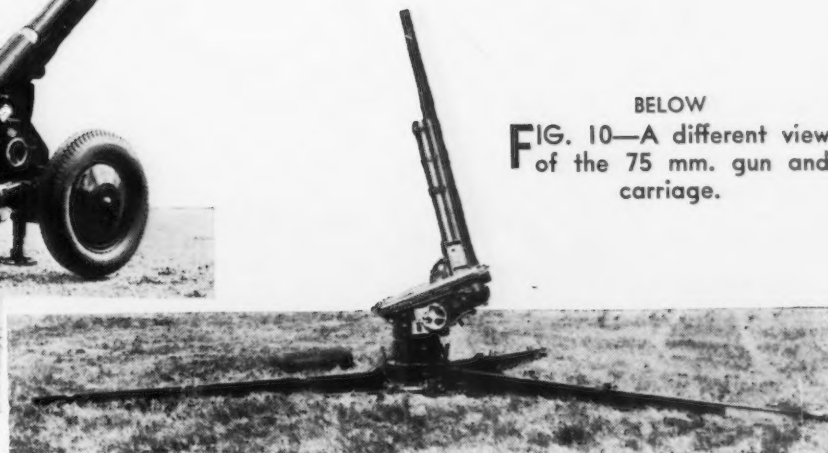
LEFT  
FIG. 8—75 mm. pack howit-  
zer and carriage broken  
down into individual units.



**FIG. 9**—75 mm. carriage gun.



BELOW  
**FIG. 10**—A different view of the 75 mm. gun and carriage.



only do they go over the plant to learn what is being manufactured and how its method of manufacture may be diverted to the manufacture of ordnance materiel, but they attempt to interest the officials of the plant to accept some particular problem and lay out a definite program for its future execution.

In many instances, some plants have gone so far as to spend considerable sums of money, much to their patriotic credit, in order to plan a procedure which would permit them to change easily their peace time activities to requirements that may be developed by an emergency.

During times of heavy procurement, such as the Ordnance Department is experiencing at present, it is also the duty of the district office to act as inspector for the district in which it is located.

The mechanism of commercial inspection is quite simple as compared to the problems which arise in the inspection of ordnance materiel. This is probably due to the fact that commercial inspection is carried out at the plant where the parts are not only manufactured but are assembled and tested for ability to function and where the

final decision of the inspection is carried out.

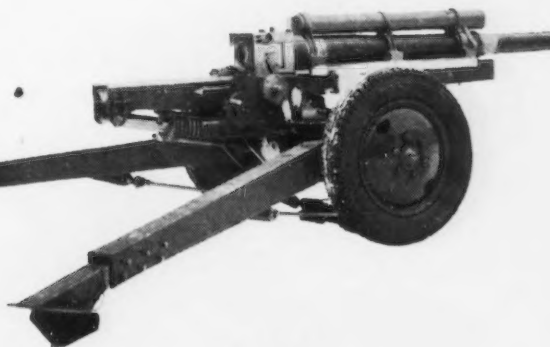
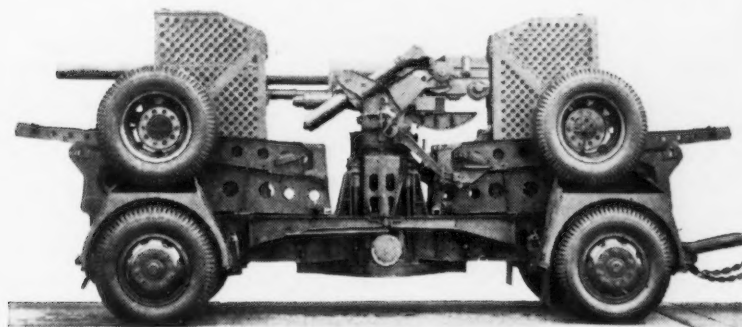
This permits the inspectors to exercise a considerable amount of personal judgment based upon the experimental and function testing of the final assembly, permitting changes in the inspection routine to take place immediately, rather than wait for the decision of someone who may or may not be in a position to understand the details of the manufacturing under which the subject parts are made.

In the Ordnance Department, inspection must be carried out at the plant manufacturing the parts. Its decision must be rendered at that time. These parts may or may not be assembled at the point of manufacture but may be shipped to some other point, perhaps hundreds of miles away, together with many

other parts having been manufactured by a great number of different companies to be assembled into a unit which must function with entire satisfaction.

Should an arsenal purchase materiel from a successful bidder within its district and should that arsenal not be in a position to furnish an inspector to check the materiel, it would be the duty of the district office, upon request of the arsenal, to make the inspection of the materiel being purchased.

In some districts, this demand for inspection has been quite heavy and, for this reason, the district office has installed an inspection branch for this work. In some cases, the inspection personnel of such an office may reach as high as 400 or 500 people since, in some instances, Federal procurement is



ABOVE  
**FIG. 12**—105 mm. howitzer and carriage at zero elevation.

LEFT  
**FIG. 11**—Anti-aircraft gun and mount; 3 in.



**FIG. 13 — A** more detailed view of the 105 mm. howitzer carriage.

tremendous in highly industrialized centers.

While it is true that the Government supplies inspection tools for these inspectors, it is also true that such equipment must be checked periodically in order to assure the high standard that is demanded by the Ordnance Department in its finished materiel and to insure interchangeability. There are six arsenals where the checking of such instruments and tools can be carried out. Obviously, with the great number of inspectors employed, it would be impossible for these arsenals to carry out all the testing work required to keep the test tools of the district offices as well as their own up to the standard of quality demanded. As a result, there have been established at various locations within the districts, usually a university, suitable gage laboratories for making these checks.

These laboratories are located at the following universities: Stanford University, University of

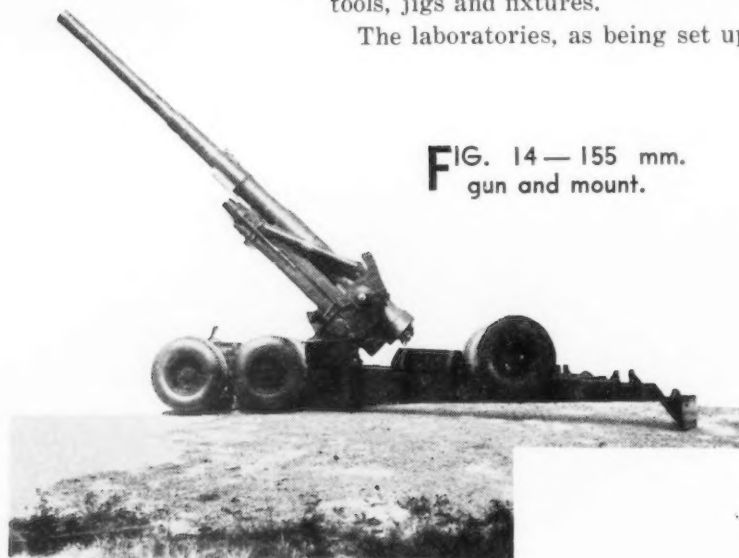
Michigan, New York University, Carnegie Institute of Technology, University of Cincinnati, Washington University, St. Louis, Case School of Applied Science, Cleveland, Armour Institute, Chicago.

The university furnishes the room, heat, light and, in some cases, air conditioning equipment, while the Government furnishes the nec-

essary instruments and devices for checking the inspection tools. In exchange for housing these various instruments, the university is permitted to use them for class instruction for certain types of engineers whose studies carry them into such fields of endeavor.

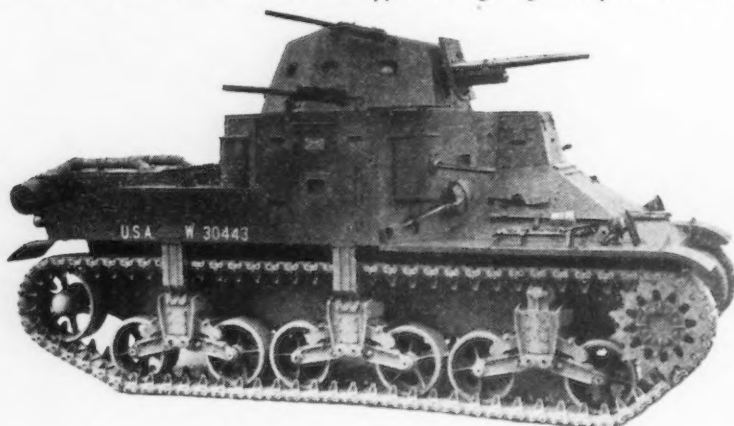
It is the ultimate desire of the Ordnance Department to install one of these gage laboratories in each ordnance district. It may be seen by those already located that fairly good progress has been made in this direction. This work is under the supervision of a man highly skilled in the design and inspection of tools, jigs and fixtures.

The laboratories, as being set up



**FIG. 14 — 155 mm.** gun and mount.

**FIG. 15—A** medium tank of the type now going into production.



at the present time, may cost from \$15,000 to \$125,000. This amount is for equipment only. As already noted, the housing, heat and light are furnished by the universities where the installation is made. These laboratories make it a relatively simple matter for the district inspectors to have their equipment checked without delay.

Even though district offices and places for checking instruments are available and instruments may be purchased without too much wasted effort, inspectors must still be found to carry out the inspection operation. In order to accomplish this, the Civil Service Commission has classified inspectors in various grades. As the district offices require these inspectors, the appropriate Civil Service district manager is requested to furnish a certificate of persons who have qualified in appropriate examination, from which new appointees are selected according to the ratings which have been assigned by the



Civil Service Commission. Many of these men are then given a special training course at some arsenal to acquaint them, in detail, with the type of materiel they will be called upon to inspect. This is necessary because of the fact that very little ordnance equipment is manufactured during peace time and, consequently, very few men are in a position to inspect such materiel.

In this connection, Rock Island Arsenal has graduated several of these classes, the largest of which has been composed of about 75 men.

These inspectors come from all parts of the country to obtain training for the work they will be called upon to perform at some future date.

#### Arsenal Training Necessary

Training at Rock Island Arsenal covers the inspection of artillery carriages of various caliber, tanks, small arms and equipment; while that at Frankford Arsenal may cover the inspection of different types of ammunition.

In recapitulation, then, it is seen that the United States is divided into districts, and the function of these districts is to line up the individual manufacturing establishments for the manufacture of ordnance materiel and to furnish inspection facilities to cover this manufacture.

The photographs, Figs. 2 to 15, give the layman an idea of what is manufactured at Rock Island Arsenal. Rock Island Arsenal not only manufactures materiel for ordnance use but also takes part, to a great extent, in the design of such equipment. By the combined efforts of the Ordnance Department, Washington, D. C., and the design section at Rock Island Arsenal, the

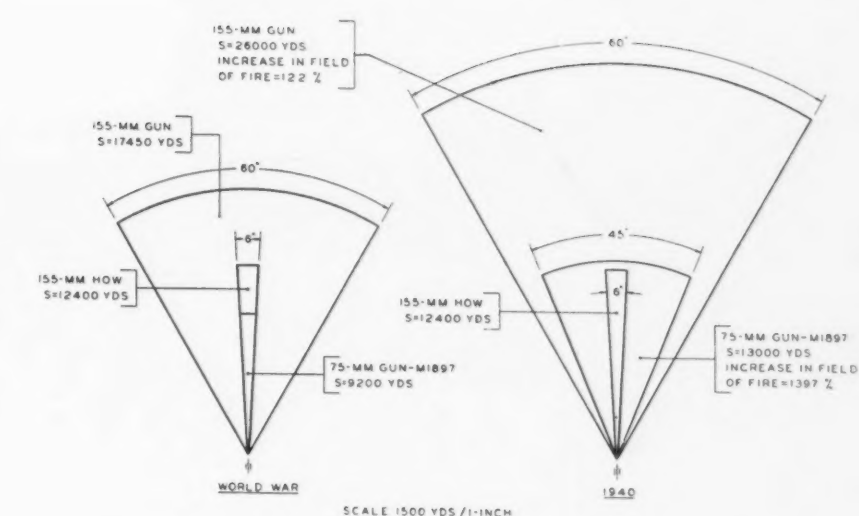


FIG. 16—These diagrams show the improvement in the fields of fire for a 75 mm. gun, since the last World War.

equipment of the first world war has been greatly improved. This improvement is shown in Fig. 16. It was made at a time when few people realized that the Ordnance Department was really improving its equipment and at a time when personnel and money were extremely scarce for any such activity.

In turning attention to inspection at Rock Island Arsenal, it should be noted that this operation is divided between three separate and independent groups:

(1) Laboratory, the duty of which is to anticipate difficulty from the raw material standpoint, permitting nothing to reach the shop that does not fulfill the requirements of the specification under which it was purchased. By this means, the manufacturing shop need worry only about physical fits and dimensions.

(2) Shop inspection, the duty of which is to anticipate difficulties

during the progress of manufacture, permitting nothing to pass which might cause difficulty in the proper functioning of the mechanism being built.

(3) Final inspection, the function of which is to see that the finished assembled unit functions properly. This department has the final word covering the work of both the other departments, although the other departments are entirely independent, using methods best suited to accomplish their objective.

While final inspection has the last word on the acceptance of raw and finished materials, the judgment is many times based on the recommendations of either or both of the results reported by the laboratory and the shop inspection.

*Ed. Note: Next week the author continues with detailed data and manufacturing technique for the caliber .30 machine gun belt link.*

## High Temperature Protection for Metals

THE Porcelain Enamel & Mfg. Co., Baltimore, has developed a material, called Metlseel, which is claimed to prevent corrosion and disintegration of metal parts exposed to gaseous atmospheres at furnace temperatures. With the in-

creasing difficulty of obtaining heat-resisting alloy steels due to priority rulings, it is believed that Metlseel will be of interest to the heat treating industry.

Metlseel, which is applied as a liquid coating, is said to withstand

heat in excess of 1500 deg. F., prevents oxidation and keeps the metal parts sound and clean.

Additional information concerning this product, its cost and methods of application, may be obtained by writing the maker.

# Short-Term Training At Warner &

**T**YPICAL of what is being done all over the country to offset the shortage of skilled machine shop workers is the experience of one of the leading machine tool builders, which began its short-term learner program six years ago.

o o o

**O**NE of the most serious problems that faced the country when the defense program was first launched was how to provide sufficient skilled shop personnel to man industry's productive equipment. For many long years of depression virtually no new workers had been trained. More than that, because of the lack of opportunity, thousands of skilled men, many of whom had records of invaluable experience, had left industry for other jobs. Some had opened gasoline stations, others had gone into automobile repairing, and of course many others had grown too old or had passed on.

The demand for skilled man-power that faced the country when the defense program was launched was tremendous. Realizing that there are over 100 separate machining operations in producing a single 75 mm. shell and fuse, for example, that there are over 3000 machining operations in producing a single 0.50-caliber machinegun, over 45,000 machining operations in producing a single 14-cylinder aircraft engine, and so on, and realizing the incredible quantities of all items of defense equipment that would be required, some people predicted that the defense program would be stall-

ed for months because of the lack of skilled hands. They painted a terrible picture of thousands of machines standing idle while new men were being trained to run them.

Such a situation as painted by these gloomy prophets, of course, never materialized. True, there is definitely no surplus of skilled manpower and there is a very serious shortage of all-round mechanics and toolmakers. These men require years of experience and there is just no way of telescoping their training into a short period of time. Moreover, there is undoubtedly a substantial percentage of machine tool equipment that is not being operated today at anywhere near capacity because these machines are not properly tooled up and in many ways are not being handled efficiently by their operators. However, the skilled labor problem is assuredly under control and a remarkably good job of providing skilled shop personnel, where it is needed and at the time it is needed, is being done.

## Employment Doubled

Because the machine tool industry was one of the first to feel the effects of the defense program, it has, together with the aircraft engine industry, showed the way toward the solution of the training problem. Since the outbreak of the war in Europe in September, 1939, the machine tool industry has more than doubled its total employment. When it is remembered that in September, 1939, the industry, with orders from the British, French and Russians, was already operating at a level about equal to that of the peak year of 1929, one can appreciate what it has accomplished.

Employment was more than doubled by training thousands of new men, very few of whom had ever previously been inside a machine tool shop. These men were given an intensive, short-term training of from two weeks to six months, at the end of which time they were able to operate with creditable speed and facility thread grinders, boring mills, turret lathes and other equally difficult metal working equipment.

Some of the companies in the machine tool industry organized their learner training programs way before the country's defense program was launched—even before the outbreak of the war. The Warner & Swasey Co. was one of these. Our company has a record of shop training that goes back more than 60 years. Worcester Warner and Ambrose Swasey, the two founders, were themselves both graduate apprentices and when they set up their own shop in the early 1880s they were sufficiently mindful of personnel problems to organize an apprentice training program of their own.

## Learner Program Began in 1935

Our apprentice school is still training young men. The training period is four years and is designed to provide the company with foremen, assistant superintendents, service men, and other supervisory personnel. It was long ago made a school for what might be called advance work. In other words, even a decade ago it was no longer a means of training mechanics and machinists.

In 1935, however, it became apparent that the supply of skilled



# Swasey

By RAY J. BLYTH  
Personnel Director, Warner & Swasey  
Co., Cleveland



**W**ARNER & SWASEY has almost 3000 shop employees, and of this number, about 45 per cent are men trained on the job since the outbreak of war in September, 1939.

shop men who might walk into the employment office looking for a job, or who might answer an ad in the paper, was near exhaustion. The depression years had so completely disrupted the labor market that we felt that the anticipated increase in industrial activity would find us at a serious disadvantage. It was in that year, therefore, that our short-term learner training program was launched with the purpose of developing single-machine operators rather than all-around mechanics.

That program has been in continuous operation ever since. During the recession of 1938 the induction of new men was slowed down considerably, but our experience in learner training remains unbroken for the six-year period. The program has naturally been improved in detail over the years as some of the kinks were ironed out, but it remains basically the same today as it was when first launched.

Trainees are of all ages, from youngsters of 19 who are just completing their public high school work at night, to men of 40 and older. At first we selected only those younger men who had majored in machine shop work in high

school, or those older men who had had a good deal of experience at non- or semi-skilled jobs in manufacturing plants.

In recent months, however, with many other industries in the Cleveland area also training learners, we have found that getting good prospects is becoming increasingly difficult. Not only are men required for work throughout the city in existing plants but they are also being trained for entire new defense production plants just being built that will ultimately employ thousands of men. Accordingly, we have had to alter our original high standard. This was done, however, with little, if any, sacrifice in the caliber of selectees. Our minimum requirements are still high and rigid.

## Must Read Blueprints

The chief requirements are the abilities to read blueprints and to handle micrometers. No classroom work is included in the training of learners. If a man cannot read blueprints, for example, we make no attempt to teach him. He is simply not considered for a job. All appli-

cants are, of course, very carefully interviewed. No standard written tests are given but our interviewers—all of whom have had a good deal of experience—are able to quickly spot likely-looking prospects. After all, it doesn't take long for an applicant to demonstrate whatever ability he has at reading blueprints or handling micrometers. With this basic requirement passed, the applicant is then considered for personality, character, aptitude, etc. Recent high school graduates are accepted only upon the recommendation of their school.

Due to the extreme care with which learners are initially selected, only about 3 per cent have been found unsuitable for the work later.

Men accepted for training are put through a trial period which varies from two weeks to, at most, two months. During the trial period the learners are put to work at simple jobs such as filing burrs. When the learner proves that he can use his hands and his head and that there is no question about his abil-

ity and willingness to work in a shop, he is promoted to a job in either an assembly department or a machining department.

In either case, he is assigned to work under the direct personal supervision of an experienced operator or assembler. This latter individual is selected not only because he is unusually able at his job but also because he knows how to handle men. At first the trainee does nothing more than stand by and watch his tutor, handing him tools and trying to be useful. Soon he is handling the simpler controls, and after he has learned the intricacies of the machine, begins to operate it entirely by himself. Once it is felt that the new man can be entrusted with complete control of the machine, he is promoted to a position classified on the pay roll as semi-skilled, and from there on, is entirely on his own. Usually the learner is left at the machine on which he got his training, and the experienced hand is moved elsewhere.

At this point we should give credit to the older men, both operators and assemblers. A great deal of the success of the program is traceable directly to them. Realizing the vital role they must play, not only in continuing their regular work but in passing on to others what they had learned on their own at great cost

in time and effort, these men unhesitatingly cooperated when called upon to do so.

#### Trained for One Machine

Since the whole object of the training program is to train men who will become expert in the operation of one particular machine, before a learner is assigned to a job every effort is made to select the type of machine best suited for him. We have found that this consideration is a very important one and a great deal of care is taken not only by the personnel department but by all those down the line in the shop who come in contact with the learner and have an opportunity to observe him.

Once a man is accepted for training, he is watched carefully. Every month the foreman reports in quite some detail to the employment office on his progress. In this way those who are unusually capable can be moved ahead as fast as practicable and those who are not fitted for their work can be dropped after a fair trial, yet without too much delay.

Trainees are started at the rate of 60c. per hr. This is increased 5c. an hr. within eight or 10 weeks, depending upon the learner's progress. It is increased another 5c. per hr. when the learner graduates into the semi-skilled classification, which is usually at the end of about

eight more weeks. This, of course, puts his rate at 70c. per hr.

The training period is not fixed. It may vary from two to five months, depending upon the ability of the trainee and the rapidity with which he acquires the necessary skill. However, the training period averages about four months.

#### Upgrading Program

The matter of upgrading men in all classifications and in all departments is watched carefully. Sweepers, truckers, crane operators and other non-skilled men have been encouraged by the company to learn the fundamentals of blueprint reading and gage handling in night schools and elsewhere in order to qualify as learners. Well over 100 such men have already followed the company's suggestion in this regard.

Likewise, learners are encouraged to qualify as setup men, inspectors, assistant foremen, etc. Literally dozens of men have taken advantage of this opportunity. With the number of supervisory personnel rapidly increasing, as it has been, the company has been able to promote these outstanding learners to jobs of greater responsibility.

The assistant foreman in the main assembly department, for example, the foreman in one of the unit assembly departments, two of the setup men in the grinding de-

**A** CORNER of the ram type turret lathe assembly department in the Warner & Swasey plant, Cleveland.





partment and one of the foremen in the precision grinding department—to mention just a few—all started as learners within the last few years.

In several cases men who started work in the plant as non-skilled help have qualified as learners and then worked themselves into jobs of supervisory capacity. One man, for example, started as a clerk in the tool supply department, qualified as a semi-skilled turret lathe operator, and since March of this year has been an assistant foreman. Another who started as an electric truck operator qualified as a learner in one of the assembly departments and is now a foreman in complete charge of bed and pan assembly.

In September, 1939, the company, already busy with foreign orders, had a total of approximately 1400 shop employees, exclusive of office personnel. Of this number, 105 were learners. Since then approximately 1300 additional applicants have been accepted as learners, including those in the non-skilled classification who were already on the pay roll. Of this number, almost 1000 have successfully completed their learner course and are now on the pay roll as semi-skilled hands. With the exception of a very small percentage who have fallen by the wayside, the others who were only recently hired are of course still in training. Today the com-

pany has almost 3000 shop employees, and of this number, about 45 per cent are men trained on the job since September, 1939.

The quality and quantity of the work of these new hands compare very favorably with that of the older men, and despite the absorption of such a large percentage of previously inexperienced shop workers, our production figures are breaking records.

It is to these green hands who have been able to step in and do a job in hundreds of plants like ours, as well as the older employees, that a major share of the credit will have to go when this war of defense is won.

## Special Grinder for Finishing Motor Feet

THE distance from the center of a motor bore to the bottom of the feet has to be held to fairly close tolerances, *i. e.*,  $+0$  to  $-1/32$  in. in the case of motors up to 15 hp. in size, and  $+0$  to  $-1/16$  in. in larger motors. The finishing operation on the motor feet can be handled in any one of several ways. It can, for example, be set up on a shaper or a milling machine. Most satisfactory for this work, however, in the experience of the Reliance Electric & Engineering Co., Cleveland, is the use of a surface grinder.

Advantages of the surface grinder appear to be at least twofold: (1) very little stock need be removed to finish the bottoms of the motor feet, and (2) the feet need not be braced to avoid distortion because this danger is not present with such a light cut.

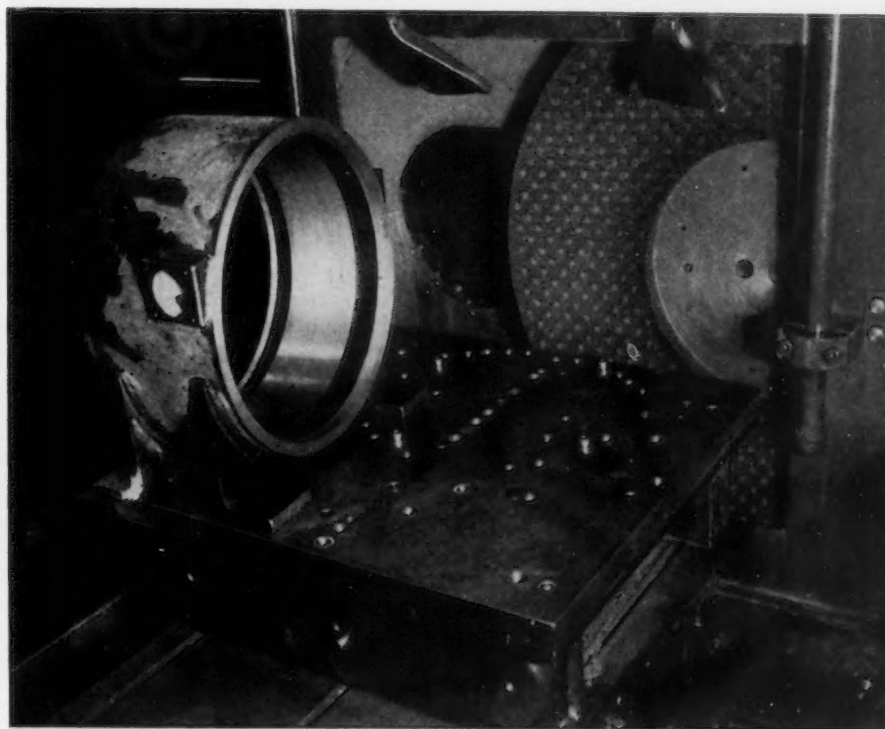
The surface grinder installed to do this operation is rather unusual in that the grinding head travels, while the worktable remains stationary. The reciprocating slide which carries the grinding head is driven through an oil pump mounted inside the base casting, and causes the abrasive wheel to make several passes across the face of the work during the grinding operation.

A sturdy knee carries the slide upon which is mounted the worktable. The type of fixture mounted on this table was specially designed by Reliance engineers. (See accompanying photo.) It accommodates nine sizes of motor frames,

and consists simply of a piece of boiler plate surfaced on both sides, in which there are a number of holes having hardened and ground bushings. All frames have finished bores and faces, these surfaces having been machined prior to the grinding operation.

Hardened and ground pins, lapped for a hand-wrung fit in the bushings and projecting above them, are provided. Since nine different sizes of frames are ground, each to be located by pins in four holes, there are 36 holes in all. The most important feature of these bushed

holes is that they are so located that the bottom of the feet of all sizes of frames are finish-ground to the same common line. Thus, when changing the setup from one size of frame to another, it is not necessary to change either the position of the cross-feed stop on the table of the machine, or to readjust the fixture itself. All the operator does is to pull the four pins out of the bushed holes, relocate them in the correct bushings for the bore of the next frame to be ground, and then secure the frame to the fixture plate by a central bolt and cross-bar.



# New Developments

## Reviewed

### by A.S.T.M.

**Technical material includes new accelerated corrosion test, effect of shot blasting on fatigue, strain hardening of cast iron, influence of bismuth in stainless steel, etc.**

THE 44th annual meeting of the American Society for Testing Materials, Palmer House, Chicago, June 23-27, attracted the largest registration in the history of the association. As usual much of the attention of the visiting technicians was devoted to reporting, discussing and approving of changes and additions in standards and testing practices. However, in addition the formal technical program was replete with valuable research reports, many of which were of major interest to those in various branches of the metal working industry.

In the opening session of the meeting, it was pointed out by J. H. Van Deventer, president and editor of *THE IRON AGE*, that organization and management of materials is the key to success in the current defense effort. In his address, "Mobilizing Materials for Defense," Mr. Van Deventer pointed out that quantitative and qualitative control of industrial materials

is more important than their applications.

Continuing, he said it is Hitler who is dictating our six-fold increase in machine tool production in the past five years, in increasing output of aluminum and, in fact, our whole defense program. Thus, our thinking must be a little better than his.

To produce 6000 bombers a year, the current program, will require 450,000 men, or more than are now employed in the automobile industry. The materials shortage will assert itself first in manpower, and second in horsepower. Branding the idea of a 10,000,000-ton increase in steel capacity as foolish, Mr. Van Deventer pointed out that with steel it is not so much a matter of capacity as the ability to obtain the kind you want when you want it.

Concluding, he stated the shortage of materials will become most acute when the defense program gets into full swing in perhaps six

months. Higher prices lie ahead—if not forced by higher wages, they will most certainly be forced by the necessity of permitting marginal plants to operate profitably.

W. M. Barr, chief chemical and metallurgical engineer, Union Pacific railroad, Omaha, Nebr., in his presidential address, pointed out that, "in the existing national emergency and in the years ahead, the safety of this nation and the future success of our whole economic life will be determined by the work of the research scientist and the production engineer."

"As they have served so invaluablely in the past four decades, so now and in the years to come, the specifications and research work of the American Society for Testing Materials will have a prominent place in solving the many grave problems that will be encountered—problems that must be successfully solved if this nation and the American way of life are to survive," according to Mr. Barr.

The sixteenth Edgar Marburg lecture was presented by Dr. Harry L. Fisher, director of organic research, U. S. Industrial Chemicals Inc., Stamford, Conn., his subject being "Natural and Synthetic Rubbers."

And, at the conclusion of this lecture, the Charles B. Dudley medal, an annual award made to the author or authors of a paper of outstanding merit constituting an original contribution on research in engineering materials, was presented to C. W. MacGregor, associate professor of applied mechanics, Massachusetts Institute of Technology, Cambridge, Mass. The award was for Mr. MacGregor's paper "The Tension Test," presented at the 1940 annual meeting in Atlantic City.

It was decided and reported that next year's spring meeting and group committee meetings will be held in Cleveland, March 2 to 6, and the annual meeting will return to Atlantic City, N. J., June 22 to 26.

A review of some of the formal technical papers of particular interest to the metal working industry follows:

#### Accelerated Corrosion Test

It is well recognized that an accelerated atmospheric corrosion test for the evaluation of ordinary and low-alloy steels must be capable of producing relative corrosion rate



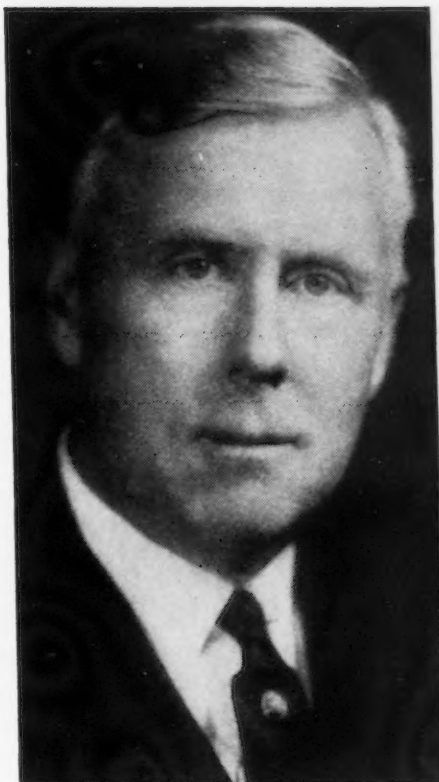
values which are within the spread of the relative rate values disclosed by field tests. It must show good correlation with actual long-time atmospheric exposure tests before it can be used with confidence.

A test described by H. Pray and J. L. Gregg involves a short (one month) atmospheric exposure followed by a two-week exposure to a laboratory cycle.

In the laboratory cycle the test specimens are subjected to a combined dew and spray wetting for 15 min. followed by a 2.5-min. drying and a 2.5-min. cooling period. The mechanism is completely automatic, thus permitting 72 cycles per day.

The accompanying table lists the maximum, minimum and average relative corrosion rates for three series of steels determined at four exposure stations after one, two, and four-year periods, the relative rates after one month of atmospheric exposure and after one month of the indoor cycle alone. It can be seen that a variation exists in relative corrosion rates with both duration and location of the exposure. The short-time atmospheric and the indoor cycle alone are both valueless as a means for predicting atmospheric behavior.

The table also contains results of the accelerated test (one-month atmospheric exposure plus two weeks indoor cycle) for the same steels. In general, the relative rates shown by the accelerated test fall within the maximum and minimum atmospheric values after extended out-



G. E. F. LUNDELL  
Incoming President of The A.S.T.M.

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door exposure. This is the case for all materials listed with the exception of the relatively highly resistant steel "Q." The order of corrodibility of steels of any of the three series is as clearly revealed by the accelerated test data as by

the long-time atmospheric exposure tests at the several test stations.

The accelerated test is not considered as being applicable to all materials, nor as a possible standard atmospheric test for low-alloy steels. It is presented as an example of the fact that short-time tests for specific purposes can be devised and can be used to eliminate in part the necessity for tedious and time-consuming field tests.

### Shot Blasting vs. Fatigue

The term shot blasting is applied to the process whereby the outside surface of a metal is subjected to the impingement of steel shot. The effect of the chilled cast iron shot cold works the outer surface and also develops residual compressive stresses in this region. The result is that under controlled conditions considerable increase in fatigue life can be obtained. Subject to certain reservation this increase is obtained regardless of whether the original surface was machined.

In the light of the experimental data given in a paper on "Shot Blasting and Its Bearing on Fatigue," by J. M. Lessells and W. M. Murray, and also the results of previous work by Zimmerli, it was reported that under certain conditions considerable increase in fatigue life and endurance limits can be expected from shot blasting. This is true for all the steels tested, but in the case of those steels which have high residual stress due to quenching and insufficient tempering this increase on endurance

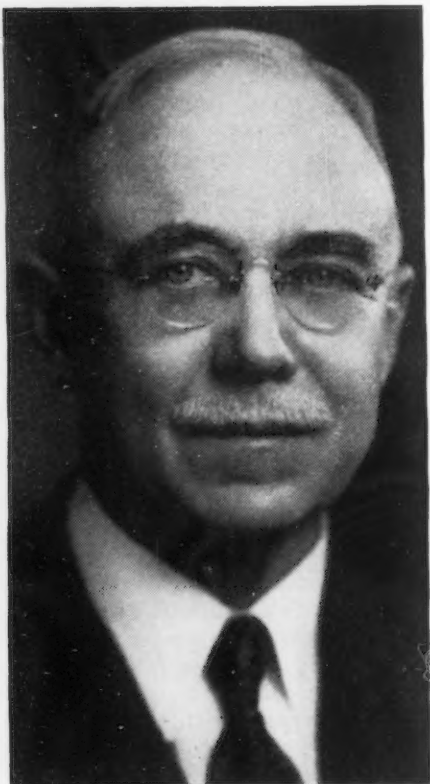
Comparison of Accelerated Test With Atmospheric Exposure Data

Mark	Composition								Atmospheric ** 1 Year			Atmospheric 2 Years			Atmospheric 4 Years			One Month Atmos- pheric ***	One Month Indoor Cycle	Accelerated* Test	
	C	Mn	P	S	Si	Ni	Cr	Cu	Max	Min	Av.	Max	Min	Av.	Max	Min	Av.			No. 1	No. 2
Series "A"																					
E	0.03	0.04	0.012	0.030	0.01	0.05	....	0.08	157	143	150	163	151	153	172	152	164	106	160	143	133
B	0.09	0.51	0.050	0.028	0.05	....	....	....	118	106	111	115	108	112	113	108	111	102	117	103	110
D	0.10	0.48	0.045	0.025	0.05	....	....	0.25	100	100	100	100	100	100	100	100	100	100	100	100	100
M	0.09	0.52	0.167	....	0.69	....	0.99	0.50	79	68	75	67	60	62	58	49	54	100	140	66	60
P	0.07	0.38	....	....	....	....	2.00	0.30	94	81	90	84	73	80	75	67	72	106	175	83	82
Q	0.09	0.46	....	....	....	....	4.76	0.31	42	28	33	37	25	29	30	21	24	100	94	61	53
Series "B"																					
CV	0.10	0.51	0.02	0.043	0.13	....	....	....	100	130	100	100	100	100	100	100	100	100	....	100	100
GA	0.11	0.53	....	0.11	0.14	....	....	....	121	110	117	144	138	141	....	....	....	106	....	128	139
GB	0.11	0.48	....	0.17	0.12	(no Al added)			136	118	130	234	174	205	....	....	....	100	....	135	140
GC	0.11	0.51	....	0.16	0.18	....	....	....	150	136	144	282	182	215	....	....	....	100	....	147	147
Series "C"																					
JG	0.11	0.64	0.100	0.04	0.31	0.76	0.61	0.68	84	74	80	75	57	67	....	....	....	....	....	72	....
JH	0.10	0.65	0.100	0.03	0.38	0.81	0.62	0.61	86	75	82	75	58	65	....	....	....	....	....	71	....
JN	0.10	0.59	0.16	0.03	0.36	1.01	0.64	0.67	67	77	70	66	53	61	....	....	....	....	....	74	....
JR	0.11	0.71	0.150	0.04	0.39	1.98	0.61	0.61	77	63	71	62	52	58	....	....	....	....	....	68	....
JT	0.12	0.70	0.060	0.04	0.41	3.04	0.61	0.61	74	60	67	59	50	55	....	....	....	....	....	55	....
JV	0.12	0.77	0.14	0.03	0.41	2.99	0.61	0.60	65	53	61	53	41	48	....	....	....	....	....	47	....
KG	0.08	0.38	0.008	0.038	0.025	....	....	....	163	134	152	189	139	158	....	....	....	....	....	183	....
D	....	....	0.045	....	....	0.25	....	....	100	100	100	100	100	100	....	....	....	....	....	100	....

\* One month atmospheric plus two weeks indoor cycle.

\*\* At four test stations: Bethlehem, Boston, Columbus and Pittsburgh.

\*\*\* At Columbus.



DEAN HARVEY

New Vice-President of A.S.T.M.

o o o

limit may not be in evidence. Evidently when the high compressive stresses on the outside due to quenching have compressive stresses due to shot blasting superimposed there is created a condition in which the cold working of the surface has little or no effect. At least the available experimental evidence seems to point that way.

Previous research had indicated that a smooth and highly polished surface is necessary for high fatigue strength. This now requires some modification because in the case of shot blasting the surfaces are not smooth.

The conclusions drawn by Lessells and Murray from their work are as follows:

(1) Considerable increase in fatigue life and endurance limits of steels can under certain conditions be obtained by shot blasting the surface. By inference similar advantages may be gained for metals other than steel.

(2) The increase in fatigue life and endurance limits seems to be due to a cold working of the outer surface although the resulting compressive stress may be beneficial.

(3) There does not appear to be any advantage as regards endurance limits in shot blasting surfaces where high residual stresses due to quenching and insufficient drawing are present.

(4) The beneficial effects can be removed by annealing but annealing at low temperatures, provided this is not sufficiently high, is beneficial as regards fatigue life for shot-blasted surfaces.

#### Gray Cast Iron

Another paper, "Strain Hardening of Gray Cast Iron," reported on a somewhat informal study undertaken in an effort to explain a phenomenon noted in the laboratory of the College of the City of New York. When cast iron was tested in compression, it was discovered that the Rockwell hardness number showed a marked decrease after test. Such a result is diametrically opposed to the amorphous metal hypothesis, the slip interference theory, or any other theory regarding strain hardening.

The experimental data presented by the author, J. S. Peck, show the effect produced upon the Rockwell hardness of gray cast iron by compressive loads of increasing intensity. Specimens of gray cast iron, 1 in. square and  $\frac{1}{2}$  in. high were used. The Rockwell B hardness of each specimen was obtained prior to loading by averaging 64 readings, 16 on each face. The specimens were then subjected to compressive loads, increasing by increments of 10,000 lb. per sq. in. and their Rockwell hardness obtained again. The change in hardness was computed and the results plotted. In order to investigate the possible effect of the height of the specimen on the results, a series of check tests was run using specimens 1,  $1\frac{1}{2}$ , 2, and 3 in. in height, respectively. No material effect was observed.

The data show that up to about 40,000 lb. per sq. in. the Rockwell B hardness increases slightly. From 40,000 to 60,000 lb. per sq. in. no significant change in hardness was observed. From 60,000 lb. per sq. in. to failure the Rockwell B hardness decreased rapidly.

In order to explain this apparent violation of all the theories of strain hardening, micrographs were made of the same spot in one specimen after increasing compressive loads had been applied. These micrographs, taken in the polished

and unetched condition, show minute cracks appearing after a load of 60,000 lb. per sq. in. and increasing after succeeding loads until failure.

It is concluded that the apparent softening of the metal as indicated by the differences in Rockwell hardness values taken before and after compressing is due to the penetrator of the Rockwell tester slipping into one of these minute fissures and giving a lower reading.

#### Bismuth in Stainless

With so much stainless steel being produced today in bar and rod form, and subject to subsequent machining, any data on the machining properties of stainless steel are particularly timely. A report on this subject entitled "Addition of Bismuth for Producing Free-Machining Stainless Steels," was presented by H. Pray, R. S. Peoples, and F. W. Fink.

The authors reported that laboratory tests and foundry experience lead to the conclusions that:

The addition of small amounts of bismuth (0.1 to 0.5 per cent) to

### New Officers of A.S.T.M.

#### President

G. E. F. Lundell, chief of the chemistry division, National Bureau of Standards, Washington.

#### Vice-President

Dean Harvey, materials engineer, engineering laboratories and standards department, Westinghouse Electric & Mfg. Co., East Pittsburgh.

#### Members

##### of the Executive Committee

A. W. Carpenter, manager of the testing laboratories, B. F. Goodrich Co., Akron.

T. A. Fitch, director of the Bureau of Standards, Los Angeles.

C. D. Hocker, plant products engineer, Bell Telephone Laboratories, New York.

J. L. Miner, director and vice-president, Atlas Lumnite Cement Co., New York.

E. W. Upham, engineering department, Chrysler Corp., Detroit.



the corrosion resistant stainless alloys results in a remarkable and useful increase in their machinability with no detriment to, and in some cases, an improvement in their corrosion resistance.

Small bismuth additions to the cast corrosion resistant chromium and chromium-nickel alloys with and without molybdenum, columbium, titanium, etc., materially improve their machinability, affect the mechanical properties important in corrosion resistant service in no major degree, improve the galling resistance, do not in-

jure weldability, and in general exert no deleterious effect upon corrosion resistance to any corrodent so far studied. In certain specific cases, corrosion resistance is somewhat improved.

The advantage of improved machinability is gained without sacrifice of the important properties of these corrosion-resistant castings. A similar condition probably holds for the wrought alloys, but these have not yet been exhaustively studied. The hot working of bismuth-containing 19-9 and 25-12 alloys, while feasible, must be carried

out at somewhat lower than usual temperatures.

The decreased ductility in short-time tension tests at 1800 deg. F. indicates that care will be needed as to the type of applications to high-temperature service, but the maintained strength indicates that the load carrying ability may be satisfactory. Because the pressing need for machinability is greater in the case of assemblies for corrosion resistance than in that of heat resistance, work to date has been concentrated on the former.

## New Film for Sensitizing Metal

**D**EVELOPMENT of Matte Transfer Film, a photographic material for sensitizing metal plates for use in a template process that shortens the time between engineering and test flights in the aircraft industry from two to four months, is announced by the Eastman Kodak Co. The process can also be effectively used in the automobile industry or by any manufacturer using metal templates, nameplates, etc.

According to an official of the Lockheed Aircraft Corp., with the development of this new film for use in their new photo-loft-template process, aircraft production cost is cut approximately \$20,000 a model.

In the contact method of making prints on photosensitized metal, the engineering drawings are made on metal plates which have been given a coating of a material which will fluoresce in the presence of X-rays. This coating is likewise of such a nature that it can be drawn upon satisfactorily. If positive prints on the metal are desired, a photosensitive glass plate is placed in contact with a treated surface of the plate bearing the mechanical drawing and the exposure is made by means of X-ray through the back of the metal plate. The processed glass negative is then printed onto a sheet of photosensitized metal in the usual way. If a mirror image negative on metal is used for the templates, the photosensitized metal sheet is placed in contact with the above treated metal drawing sheet and exposed through the back of the metal by means of X-ray. The negative mirror images obtained may, of course, be made



**L**AMINATION of Eastman matte transfer film at the Burbank, Cal., plant of the Lockheed Aircraft Corp. Photo courtesy of Lockheed.

into "right" images by simply turning over the finished template.

The Lockheed Aircraft Corporation, a pioneer user of Eastman Matte Transfer Film, has made satisfactory use of enlargements of mechanical drawings on photosensitized metal plates. In this process the mechanical drawings are made directly upon lacquered metal sheets. These mechanical drawings are then photographed on glass plates in a special camera designed for this purpose. These glass negatives are then enlarged onto the photosensitized metal sheets. By this method photo-templates as large as 4x12 ft. have been made. It is reported that photo-templates can be made with a tolerance of 0.001 in. per ft.

It has been found that the most simple and effective method of producing sheets of photosensitized metal consists of laminating matte transfer film to lacquered metal sheets. The film consists of a sensitive emulsion coated on a thin film support, the latter backed by a paper base. When used, the sensitized strip is transferred (or stripped) from the supporting paper base to the lacquered metal plate. This film has a matte surface, so that it will take a pencil line in case changes or additional developments on the processed photographic image are desired.

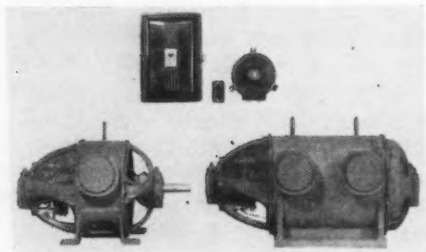
At the present time the width of matte transfer film is limited to a maximum of 34½ in. If wider plates are desired, several strips of film give the desired width and the plate is passed through the machine the required number of times for proper lamination.

# New Equipment . . .

## Power Transmission

Here are discussed some of the newer developments in the line of adjustable speed drives, motors, bearings, couplings, clutches, sheaves and belts.

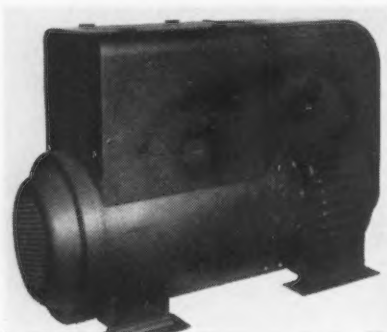
**F**OR industrial applications requiring smoothly adjustable speed over wide ranges with constant torque, in locations where only a.c. supply is available *Westinghouse Electric & Mfg. Co.* announces a new 10-to-1 adjustable speed drive, which uses a series circuit without exciter. The device is supplied in ratings from 1 to 15 hp. with a standard speed range from 175 to 1750 r.p.m., for 2 or 3



phase operation on 220, 440, or 550 volts, 60 cycles. It consists of a single unit motor-generator set with a squirrel cage induction motor driving a series d.c. generator which supplies operating voltage for the motor which is coupled to the drive load. In parallel with the generator series field is a rheostat which controls the d.c. motor speed. Control apparatus also includes an across-the-line starter and a push-button station. Flexibility and efficiency are claimed to have been markedly improved and high torque characteristics of the d.c. series motor have been combined with the flat speed properties of the shunt motor for good speed-torque characteristics. Optional features include dynamic braking and inching. Open frames are standard, but splash-proof and totally enclosed ones are also available.

### Adjustable Speed Drives

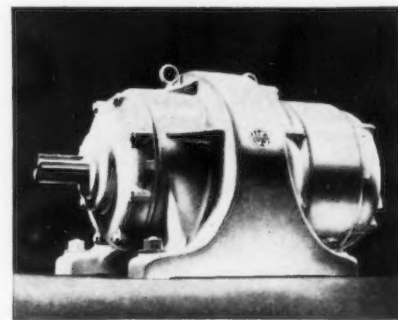
**A**DDITIONAL adjustable speed drives of 20, 25, and 30 hp. are announced by *Reliance Engineering Co.*, Cleveland, to meet the demand for its all-electric a.c. drive in sizes which extend this simple method of control to larger applications. The motor-generator unit has been mounted horizontally instead of vertically as in the smaller sizes. The mounting brackets contain special longitudinal rubber shock pads to insure quiet operation. The 3-phase, 60-cycle power source of either 220, 440, or 550 volts is connected to the control unit and secondary circuits are run to the d.c. driving motor, speed adjuster and start-stop push button station. Controls can be located to suit the operator. The variable speed, which can also be supplied in splash- or explosion-proof types, can be started and stopped without interfering with the speed setting.



Quick stopping is obtained by regenerative braking. Very slow speeds are attainable for threading or setting up work and there are infinite speed variations within an over-all speed range of 16 to 1.

### Gear Motors

**D**DOUBLE and triple reduction geared motors up to 30 hp. at 91 r.p.m. have been added to the Synchrogear line of the *U. S. Electrical Motors, Inc.*, 80 34th Street, Brooklyn. Larger units incorporate the pyramidal gear pedestal design which provides ample support to withstand the extra torsional



strains and load shocks of geared power. Normalized castings are used and permanent alignment of bearings and gears is assured. Both primary and secondary gears dip in a large oil reservoir in the base of the motor. The design provides an ample oil supply to all bearings and gears without submerging the rotating parts.

### Speed Test Rig

**C**OMBINING the infinitely variable speed P.I.V. transmission with an adjustable mounting bracket on a rigid welded steel base, *Link-Belt Co.*, Philadelphia, has developed a compact, fully enclosed variable speed rig for testing generators, magnetos, governors, tachometers, vibrators, pumps, springs, bearings, etc. These tests are made to determine



calibrations, efficiency, alinement, etc., or electrical characteristics. The mechanism to be tested is placed on the mounting bracket and connected to the variable speed



output shaft of the transmission. An electric tachometer and calibrated steel indicator driven from the variable speed shaft provide a means for observing the exact speed at which the mechanism is being tested. Two controls are provided: direct handwheel and vernier micrometer speed control.

#### Motorized Transmission Control

**N**EW series of Select-O-Speed transmissions equipped with electric motorized control is announced by *Ideal Commutator Dresser Co.*, 1925 Park Avenue, Sycamore, Ill. These new models supplement the standard line in sizes from 1½ to 7½ hp. capacity and are equipped with lever type and handwheel control. The electric control is especially recommended where the drive must be mounted on the ceiling, back of or inside the equipment. Changes in speed adjustments are easily made by pushing and holding either the fast or slow button of the control until the desired speed is obtained.

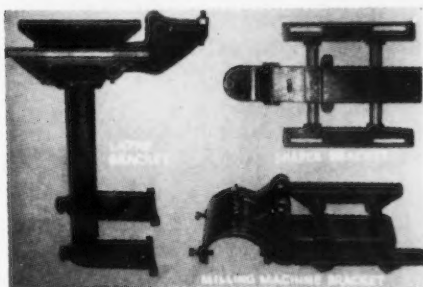
This maker also produces a variable speed pulley on the sliding motor base, adjustable sheave prin-



ciple which requires only standard V-belts. This is designed for light service with speed ratios up to 2¾ to 1 and sizes ranging up to ¾ hp.

#### Motor Mounting for Machine Tools

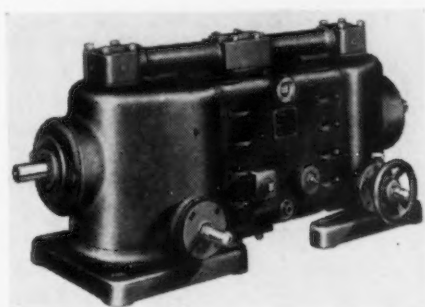
**A**LL NEMA frames No. 204 to 326 (1 to 15 hp. at 1800 r.p.m.), also practically all Canadian, British, South American and Overseas motors, can be mounted on all types of machine tools by the Multi Motor mounting, a new device brought out by *Western Mfg. Co.*, 3428 Scotten Avenue, Detroit. No special plate or rails are necessary, motor installation time is re-



duced to a minimum and provision has been made for the take up of V-belts between motor and transmission. There are three models of Multi Motor mountings for lathes, for shapers and for milling machines in two sizes of 7 and 9 in.

#### Hydraulic Pump-Motor Units

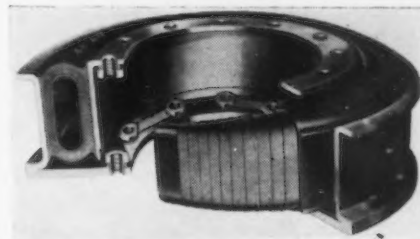
**S**TANDARD variable delivery pumps and variable displacement fluid motors are produced by *Vickers, Inc.*, Detroit, in a wide



range of sizes to provide an almost infinite variety of operating ranges for power transmission units from 2 to 300 hp. This transmission unit gives a smooth start and stop, reverse overload protection and stepless speed control when arranged between a continuous speed prime mover and the driven machine. Various types of manual and automatic control arrangements are available for use with these power transmission units.

#### Pneumatic Coupling

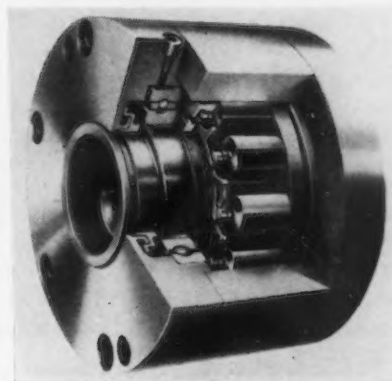
**F**LEXIBLE coupling, the Airflex, has been developed by the *Falk Corp.*, Milwaukee. This unit for diesel, oil, gasoline or gas en-



gines, is an excellent coupling for use with motor driven compressors, single cylinder pumps and other driven equipment of a similar fluctuating torque nature. The degree of resiliency can be changed readily to suit the exact requirements of a particular application, decreasing peak torque values by changing the air pressure in the rubber gland, the core of the coupling. The gland consists of a special rubber treated with a pre-molded, pre-vulcanized cylindrical section to prevent air losses. The lining is covered with multiple alternating layers of tough durable fabric and live rubber and is permanently bonded to rugged steel inner and outer rims. The elasticity of the coupling can be varied by changing the air pressure through the Schrader valve which can take any hand pump fitting or air nozzle. The coupling is made in six standard types which cover a wide range of mountings on the driven and drive shafts.

#### Indexing, Free-Wheeling Clutch

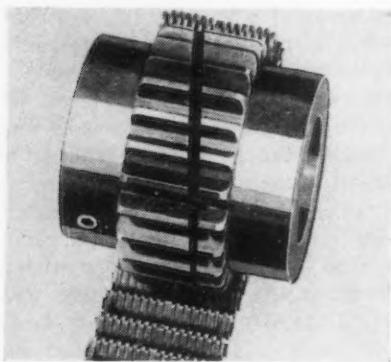
**C**ONSISTING of three primary elements, driver, driven and clam clutching members, a new clutch of simple and sturdy construction is made by *Morse Chain Co.*, Ithaca, N. Y. Since the wedging cams are always in light contact with both driver and driven



members, they instantly lock these members together when torque is applied and drive the load. Likewise when application of torque ceases, the cams instantly unlock, permitting the drive members to rotate to indexing position on the return stroke. In effect, the clutch is a self-contained ratchet with an infinite number of teeth. Therefore, unlike ordinary pawl and ratchet mechanisms, varying indexing adjustments do not alter the feed accuracy. Morse indexing clutches are furnished in 12 standard sizes. Torque capacities range from 26 to 6300 ft.-lb. They can also be used as a backstop on indexing roll feeds to prevent the stock from feeding backwards on the return stroke.

#### Chain Coupling

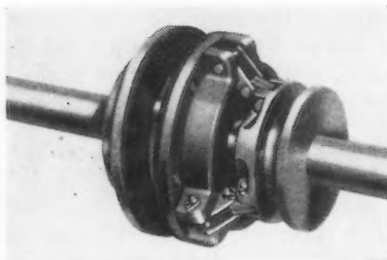
**T**YPE D flexible chain coupling of Ramsey Chain Co., Inc., Albany, N. Y., is constructed to eliminate completely the shearing



of the pins in the chain as happens frequently in both roller and silent chain type couplings. The new pinions are cut diagonally so that one pinion pulls the other through the chain, employing the full tensional strength of the chain's width and resulting in the same characteristics of an ordinary chain drive. Wear of the teeth due to excessive misalignment is distributed evenly across the entire face of both pinions.

#### Light Service Clutch

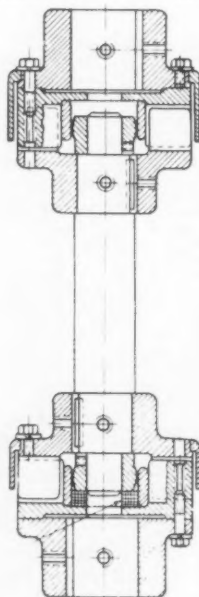
**R**ECENTLY the Rockford Drilling Machine Division of the Borg-Warner Corp., 1315 18th Avenue, Rockford, Ill., designed a new clutch for gasoline and other motors up to 6 hp., designated as the LMC. It operates on the toggle principle, going over-center, and providing easy engagement with powerful pull. Driving pressure is uniformly distributed and applied directly opposite the facing, where



it is most effective. No oiling is necessary for metal bushing which carries the sprocket, pulley, or other driven part. The end plate is threaded for fine adjustments. All toggle parts are hardened. Clutch plates are hardened and ground, and faced with selected material. The LMC clutch transmits 1 hp. at 100 r.p.m., proportionately larger or smaller loads as speeds vary.

#### Floating Shaft Coupling

**R**ECENTLY the Lovejoy Flexible Coupling Co., 5009 West Lake Street, Chicago, brought out a flexible floating shaft coupling. This L-R type HKQ is applicable to either horizontal or vertical drives and is recommended for the longer distance drives, especially where there is excessive misalignment. The floating shaft is supported in fixed bearings, independent of the power transmitting elements, entirely unaffected by forces generated by the floating shaft itself. The concentricity of the ends of the fixed shafts is permanently assured by this construction, eliminating whipping. Coupling can be disassembled speedily without disturbance of cushions or connected units.

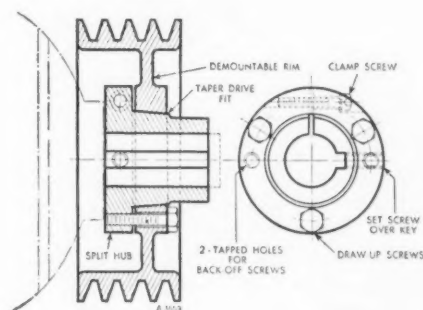


UPRIGHT APPLICATION

Either of the coupling bodies mounted on the fixed shafts may be used as a sheave or part of a sheave for V-belt drive and replacement of the V-belt is possible without disturbance of the connected machines. Three types of cushions are used and the couplings are made in standard sizes with bores from 1½ to 8½ in. for various distances between fixed shafts.

#### V-Belt Driver Sheave

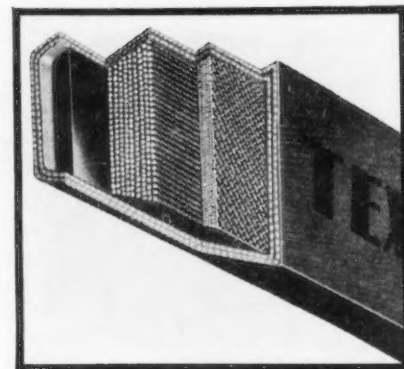
**Q**-D quick detachable and demountable V-belt driver sheave is announced by Worthington Pump and Machinery Corp., Harrison N. J., and is available in a complete range of standard sizes. This sheave is said to be constructed simply and to be suitable for quick mounting on and dismounting from shaft for changing of speed ratios to meet varying conditions, for fan blowers, machine tools, etc. Each sheave unit consists of a longitudinally split or



clamp hub and a V-grooved rim. The hub is clamped to the shaft by means of a cap screw in its flange and fastened by a standard keyway. A fit equal to a press fit is provided and the rim is taper fitted to the hub and fastened with three draw bolts. The rim can be taken off the taper without disturbing the position of the hub.

#### V-Belt

**T**EXROPE V-belts, of Allis-Chalmers Mfg. Co., Milwaukee, are now of the Super 7 laminated design, based on the Vogt formula and field experiments to include more strength and flexibility, greater service and longer life. The cords in the new belts are smaller, permitting the use of more cords per belt with a resulting greater strength and less stretch. Each cord is individually embedded in

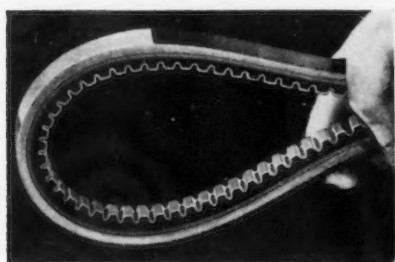




heat dissipating rubber to reduce internal belt degeneration. Live rubber bottom absorbs impacts, cord transmits power, cut of the fabric prevents dishing and assures stability transversely. Also the cover prevents destructive agents from reaching the vital belt elements.

#### Flexible Cog-Belt

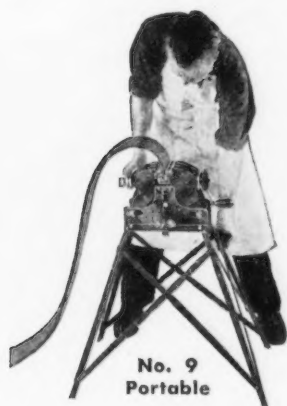
**U**SEFUL for both flat and V-grooved pulleys is a new type of belt introduced by *Dayton Rubber Mfg. Co.*, Dayton, Ohio. This Dayton Cog-Belt is designed around a new type of construction principle. The inner belt surface is



cogged so as to provide greater flexibility and longer life when flexing around small pulley diameters and to apply to drives the scientific principle of increasing traction by a non-skid design. In grooved pulleys this new belt has greater gripping power with its die-cut raw edge sides which present the same undistorted driving surface to the pulley, regardless of side wear. The new belt is made in standard lengths in a variety of cross-sections and in sets for multiple drive service.

#### Belt Lacer

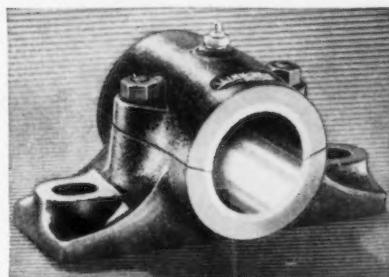
**P**ORTABLE belt lacer has been designed by *Clipper Belt Lacer Co.*, Grand Rapids, Mich. The makers claim that this is the first portable lacer which can exert a pressure as high as 30,000 lb.,



which permits embedding the belt hooks flush with the belt surface and clinching the points. Clinching jaw action "sets" the hooks in a closed position and gives the hooks maximum pulling ability over a long period of time. The solid faced, hard jaws assure perfect clinching of every hook point. This No. 9 Clipper lacer makes possible the use of a larger size connecting pin by producing a straight line of well rounded loops. It will lace one end of any belt up to 6 in. wide in one quick and easy operation.

#### Babbitted Bearing

**D**ESIGNED for moderate speed and power requirements a new streamlined babbitted bearing common flat box (Series 2-1200) is available in 24 sizes for shafts  $\frac{1}{2}$  to 3 in. in diameter from *Link-Belt Co.*, 2410 West 18th Street, Chicago. Sloping surfaces between cap and base maintain concentricity and relieve cap bolts of direct strain from side thrust. Removable shims between base and cap provide for adjustment and the cap



design reinforces bolt lugs by proper distribution of metal where holding strain is exerted. The bore is broached to size to assure concentricity and proper fit on shaft. Base is ground to close tolerances. Link-Belt's series 100 ball bearings and 400, 500, 600 and 7200 roller bearings have been renamed to conform with corresponding weights of fighters from welter to heavy weight in accordance with the renaming of these bearings to Friction Fighter Bearings.

#### Open-End V-Belting

**A** NEW line of open-end V-belt- ing for application on drives where endless V-belts cannot be applied, is announced by the *B. F. Goodrich Co.*, Akron, Ohio. This belting is made in maximum 50-ft. lengths and in top widths of  $21/32$ ,

$7/8$  and  $1\frac{1}{4}$  in. and in thicknesses of  $7/16$ ,  $5/8$  and  $3/4$  in. Angle in each case is 40 deg. Metal fasteners are used.

#### Journal Bearings

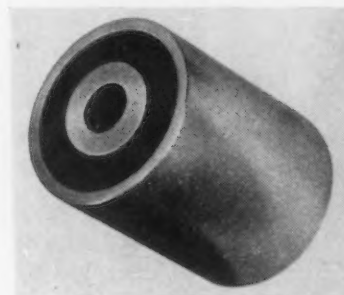
**S**OLID and split journal bearings are announced by the *Jeffrey Mfg. Co.*, Columbus, Ohio. Of accurate dimensions with modern rounded lines and smooth gun metal finish, these bearings have



machined bases and faced ends. Height to center line of shaft is rigidly maintained. The babbitted bores are broached to smooth hard surface and require no wearing in. Bearings are tapped for grease cups or pressure fittings. The split bearing has also feeder grooves on each side. Individual containers are furnished for easy handling and protection in shipping.

#### Light Bearing as Overload Device

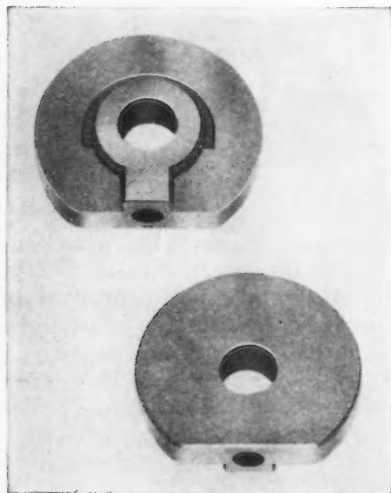
**T**ORFLEX bearings are announced by *Harris Products Co.*, 5421 Commonwealth Avenue, Detroit. These rubber backed bearings are made 4 ft. long and then cut to required length. Sizes range from  $3/16$  to  $3/8$  in. inside diameter and  $3/8$  to  $4\frac{1}{8}$  in. outside diameter for 15 deg. and up to  $5\frac{1}{16}$  in. outside diameter for 30 deg. torsional deviation. Although originally designed as vibration dampener, noise eliminator, shock absorber, it was shown that under overload the bond between the rubber wall and the inner sleeve will slip intermittently and brake the overload. Most bearings are available with seamless steel inner and outer walls; a



few, however, are stocked with brass, graphited bronze or stainless steel inner walls. Rubber can be replaced by neoprene if desired.

#### Self-Lubricating Bearing

**P**OWDERED alloys are molded to size in the shape desired for Selflube porous bearings, then baked and finally oil quenched. Bearings have an average porosity of 35 per cent; they can therefore



store a large amount of oil, which forms a protective, continuous oil film on the bearing surface. In many instances this oil reserve outlasts the life of the application eliminating the use of oil vents and grease cups. Only for heavy and continuous applications is additional lubrication recommended. Because of their high strength of 35,000 lb. per sq. in., these bearings will carry maximum loads without distorting and breaking. Friction, noise and scouring of shaft are greatly reduced. Tolerances are such that no redesigning or special engineering is required. *Key-stone Carbon Co.*, 1935 State Street, Saint Marys, Pa., is the maker.

#### Pulley Coating

**N**ONSLIP Rubberpull is a new product of the *Nonslip Pulley Covering Co.*, 777 Hertel Avenue, Buffalo. This material is supplied in liquid form in convenient containers and is readily and easily applied with a brush to the face of any flat or V-type pulley to prevent belt slippage. Tests are claimed to prove that this substance increases the efficiency of belt drives by 50 per cent. The product has a rubber base and can be applied in a few minutes.

#### Roller Bearing Mounting

**N**OVEL method has been developed by *Timken Roller Bearing Co.*, Canton, Ohio, for heating bearing cones for assembly on shafts where a tight press fit is required. This device consists of three trays about 4 ft. square approximately 12 in. above one another. The middle tray is of pyrex glass while the top and bottom trays carry seven 250-watt infrared ray bulbs with gold plated reflectors. Bearing cones are kept in the boxes to keep them clean until they are fitted. About 20 min. are required to heat a bearing up to a



maximum of 155 deg. F. The rays penetrate the boxes, heat the steel and leave the cardboard relatively cold. When this method of heating is used, it is not necessary to wash off the protective grease coating on the bearings.

#### Rubber Packings

**S**HEET packings of Ameripol and of Koroseal, synthetic elastic materials, are announced by the *B. F. Goodrich Co.*, Akron, Ohio. Koroseal packing is made especially to resist the action of oils and solvents and some corrosives. Tensile strength is about 2200 lb. per sq. in., elongation 300 per cent, scleroscope hardness 73 to 77. It comes in 26 x 26 in. sheets of 1/32, 1/16, 1/8 and 3/16 in. thickness carried in stock and other thicknesses made to order. Ameripol is a dark sheet

packing superior to natural rubber and other synthetic packings in its resistance to oils. It ages well and provides excellent resistance to heat, cold and water absorption, tensile, 1500 lb. per sq. in., elongation 400 per cent, hardness 78 to 82. It is made to order in 100 lb. rolls, 36 in. wide in thicknesses from 1/32 to 1/4 in. It is also used for making molded or machined gaskets and rings to keep oil and grease in bearings, for steering columns, air lines, on dry dust collectors, etc.

#### Lubricating System

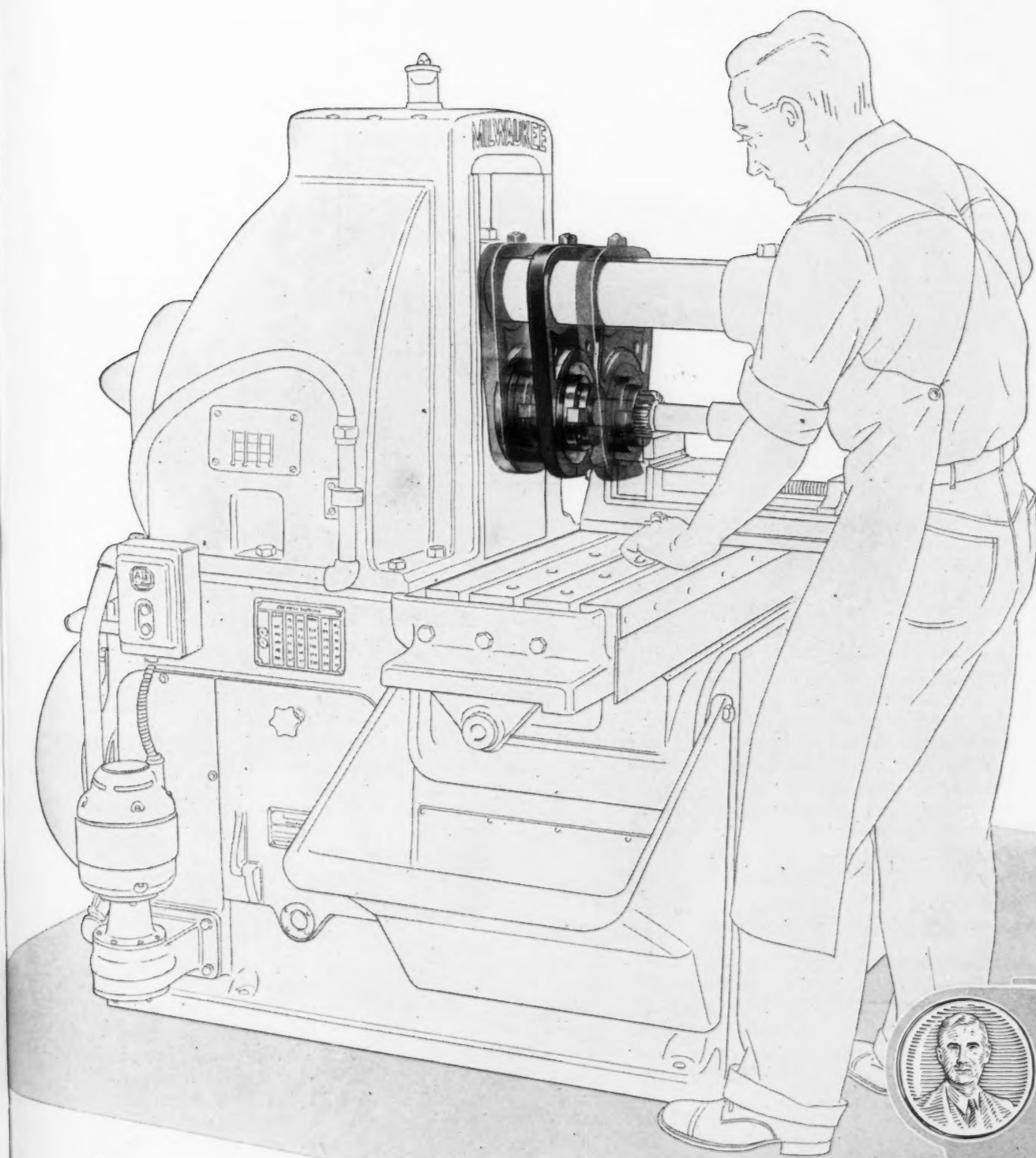
**C**ENTRALIZED lubricating system to permit high pressure grease lubrication to any number of bearings on industrial equipment is announced by *Alemite division of Stewart-Warner Corp.*, Chicago. This "Progressive" lubricating system will deliver a predetermined quantity of lubricant to from three up to 20 bearings and will indicate through a signal the completion of the operation. Any type of manually or power-operated high pressure grease gun can be used with the system. One system or a relay of systems can be installed with ease on the most intricate piece of machinery. Among the improvements claimed are: All bearings connected to be lubricated from one central point; inaccessible and dangerously located bearings can be conveniently and speedily oiled or greased during operation.





The spindle construction of Milwaukee Bed Type Milling Machines gives these machines greater range without sacrificing rigidity — the quill has a full 7 inches cross adjustment, supported over the entire range. Every unit is designed for strength, compactness and sustained accuracy under heavy continuous service.

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MILLING MACHINES

*Milwaukee* MILLING MACHINES

**D**ETROIT — One of the most important blocks of unused automotive factory space is being put to work for defense production by Nash-Kelvinator which is going to use two of the modern Reo buildings at Lansing. More than 400,000 sq. ft. of buildings No. 48 and 47 are being rehabilitated at a cost of \$8,500,000 for the production of Pratt & Whitney airplane engine parts and airplane propellers. About 3000 men will be employed in this new division.

The \$30,000,000 in Nash-Kelvinator defense orders, of which the \$21,500,000 propeller order is the major part, brings one of the important independents in the automotive industry into the defense program in a big way. Packard, Studebaker and Willys-Overland are already employed on defense assignments.

Campbell Wood, manager of the airplane propeller division for Nash-Kelvinator, has until recently headed the organization's defense efforts in Washington as assistant to the Nash-Kelvinator president. He is staffing the new Lansing plant with E. F. Keller as factory manager. Mr. Keller has only recently completed the task of tooling up the Nash plants for production of the 600 Series light Nash. He was master mechanic of the Nash division but for many years prior to that was master mechanic of Reo, whose plants are now being prepared for the Nash-Kelvinator work on defense. Production manager will be B. E. Ball, former production manager of Kelvinator. B. E. Chapman, Nash plant engineer, has been named plant engineer at the new factory, and D. E. Ellis, of the Kelvinator engineering staff, will become purchasing agent.

#### Gun Plant to Produce This Month

A progress report on the General Motors—North American bomber program has been released by E. F. Fisher, general manager of the Fisher Body Division, which will do the major part of the fabricating work on the B-25 bombers. The former woodworking plant which Fisher operated at Memphis has actually started some production on bomber parts, Fisher reveals. He also discloses that at least four other Fisher plants will work on the project and that Fisher defense contracts now aggregate \$100,000,000. The Memphis plant is being doubled in size and will not be completed until early in 1942. It will work principally on flat sheet metal and assembly operations, producing parts for 100 bombers a month. All parts and subassemblies will be shipped to Kansas City, Kan., for final assembly in the new plant being erected by

## On The Assembly Line

BY W. F. SHERMAN  
*Detroit Editor*

• Nash-Kelvinator to use idle Reo buildings for making plane engine parts and propellers as auto industry turns more and more to defense production . . . Fisher starts bomber part production at Memphis.

North American plant.

Other Fisher plants which will work on the bomber parts in Detroit will do machine work on forgings, will make deep drawn aluminum alloy parts with revamped stamping equipment, and will specialize in welding and assembly of some of the more difficult bomber parts. More than 110 key men from Fisher have been working with North American to perfect plans for production.

In addition, Ternstedt in Detroit will supply die castings, machined, and the Chevrolet Forge Shop at Muncie, Ind., will turn out aluminum forgings for the bombers.

A \$5,800,000 machine-gun plant started at Plymouth, Mich., last year by Kelsey-Hayes Wheel Co. under a contract with the British Purchasing Commission

has been taken over by the Defense Plant Corp., subsidiary of RFC. This plant is expected to get into production this month on 50 caliber machine guns with a goal of 75 guns a day.

#### Buick Plane Engine Order Doubled

Buick's defense job of producing Pratt & Whitney engines has been doubled, according to Harlow H. Curtice, president, who placed that interpretation on a Washington announcement of an \$88,000,000 expansion in the original contract. The monthly output schedule has been increased from 500 to 1000 engines. The increase in the contract will require employment of an additional 5000 men on defense work at Flint, besides 10,000 in the Chicago area. Work is already underway to convert some of the Buick plants for airplane engine production and changes have been made to increase the original construction planned at Melrose Park, Ill. This brings Buick's engine program to about \$160,000,000.

Coincident with the doubling of the Buick order, Chevrolet has received an award of an \$89,075,000 order for Pratt & Whitney engines, and will begin conversion of 1,400,000 sq. ft. of manufacturing floor space from automobile to air-cooled engine production. This plant conversion will be undertaken in about 39 days, at the end of the 1941 automobile model year for the company. The most important factory space will be the new plant at Tonawanda, N. Y., and the Chevrolet plant at Buffalo. Chevrolet also is scheduling 1000 engines a month, and all 26 Chevrolet plants will participate to some degree in the defense work.

The Defense Plant Corp. will build test cells at Tonawanda, adding about 300,000 sq. ft. to the plant area. Construction of new buildings at the gear and axle plant in Detroit is likely to be required to replace



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THE IRON AGE, July 10, 1941—75

part of the lost Tonawanda output which has been averaging 65 axles and engines an hour. This will be required to provide military truck axles as well as passenger car and commercial truck axles.

Chevrolet is the last of the major automobile units to take on a defense assignment (aside from trucks) but it was reported last winter to be holding itself in readiness for "a really big task" should one arise in the defense program.

#### Another Defense Job For Ford

Ford probably will take on another assignment, adding to the multitude of activities now being conducted at the Rouge and nearby. The grapevine reports that the Canadian armored vehicle known as the Universal (Bren) gun carrier may be produced by Ford in the United States as well as in the Canadian plants.

It is to be hoped that before the job is undertaken, some of the Canadian specifications are changed a bit. Reliable report says that the specifications originally called for steel links cut from solid blocks of

material instead of fabricated to shape by forging, or perhaps by welding. Reason behind the specifications seems to have been that the vehicle was first made in a tool room, and that machining from solid pieces of steel was the only available way for making up the links. Another odd specification called for a cast bronze name plate a quarter-inch thick (with bronze among the scarce items) and the only explanation that can be thought up for that specification is that the mechanic who build the first model (back in days of peace) must have been awfully proud of his job.

In anticipation of curtailment of new car production, the automobile industry is making extensive plans to provide all the service that may be necessary to keep old cars in proper running condition. Parts inventories are being checked carefully to provide the necessary replacements and manufacturers are assisting in the training of service men for dealers and garages throughout the country.

An ample supply of replace-

### 302 Auto Workers Forget Union Pact, Stage Heat Strike

*Detroit*

• • • There's nothing like a union contract to avoid wildcat strikes, at least on cool days. On warm days it is different. Last Monday the thermometer here got up around the 90's, so 302 workmen in the paint department of the Briggs Meldrum avenue plant decided it was too hot to work. They quit, forgetting union contracts or grievance procedure. That threw the rest of the plant out of work until Tuesday.

On Tuesday morning 1900 men walked out in an unauthorized strike, demanding that the management pay them for the time they lost on Monday due to the wildcat strike in the paint department. The Tuesday walkout threatened to throw nearly 9000 Packard workers out of their jobs, as the Meldrum plant supplies bodies to Packard.

But cooler weather on Wednesday (the thermometer dropped to 75) brought all the strikers back to work, and apparently without pay for the time lost on Monday.

**TEST FOR TRUCKS:** This Chevrolet 4x4 military truck is on a 60 per cent grade built expressly for the testing of 4-wheel Army trucks at Milford, Mich.



ment parts, mostly without need for resorting to substitute materials, is assured because manufacturers have been told that necessary alloys, etc., will be provided. Buick's W. F. Hufstader announces that a special program to mobilize service facilities and plan a parts replacement program is being undertaken. With approximately 30,000,000 cars in operation in the United States, many of them being run thousands of extra miles beyond their normal retirement age, planning of this sort is vital.

Combined effects of the summer slowing in production and the factory shutdown for the Fourth of July weekend, caused a reduction in automobile output last week. The total for four days' operations was 96,457 cars and trucks in the United States and Canada, compared with 127,926 in the previous week and 51,975 in the corresponding week of last year, according to Ward's Reports, Inc.



# A PROGRAM—To Help You Get More Output from Machines and Presses

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And it can be done. Right now machines and presses in most plants are shut down a far higher percentage of time than need be. The cause is tools—tools that were efficient by earlier standards, but fall behind modern demands for performance. Each time such a tool wears out, chips, goes out of tolerance, breaks, or fails—a machine or press in your plant is stopped—for 10 minutes, an hour, a morning or several days.

That's a solid chunk of extra plant capacity well worth using. And here is a way to get it that is being used in more than a thousand plants.

Here is a system—born in the tool room—that is being put to work to give plants more capacity—without additions to plant, new equipment, or additional trained men. With this program you can start where you are to make a general improvement in the performance of your tools, and gain extra output and lower unit costs.

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**W**ASHINGTON—The House Military Affairs Committee by a 16 to 9 vote has hit the target. But whether it will draw a prize for its straight shooting remains to be seen. There are doubting Thomases. Its surprisingly forthright criticism of the defense effort hit alike at the Administration, executive departments and Congress itself and made point after point that was telling. Each has been made in the past on a piece-meal basis from different sources. But here for the first time appears a comprehensive critical analysis. Coming from a Congressional Committee whose majority belong to the Administration it should but may not carry a great deal of weight.

The outstanding criticism in the committee report so far as the immediate situation is concerned is that the program has no single head. This is painfully true. There are even two heads in the chief defense agency—the OPM. There is a head of another defense agency—the OPACS. Already in these two instances can be seen the clogging effect of divided authority. There already have been conflicts between the two organizations. They have not been publicized much but they have taken place, and within the two-headed OPM itself there are of course differences.

#### Stout Resistance to Price Boosts

Two recent OPM resignations—occurring before the “purge” of paid trade association executives—are attributed to a row over iron and steel scrap prices. The resigning OPM members, production-minded as they should have been, wanted shipping point prices for No. 2 heavy melting steel raised to \$12 in order to get sorely needed remote purchased material to the mills. A flat refusal was the answer of the price-minded OPACS, which, on the whole, except for its disregard of wage increases as an element of cost and its slight attention to soaring food prices, has done a good job. But its stout resistance to price boosts, fine in principle, is not always realistic and predictions are made that unless relaxed it will curtail defense production. Never, it is argued, will scrap dealers be able to boost purchased supplies to the 1941 goal of 28,000,000 gross tons, 8,000,000 tons over the 1940 production, until it is made profitable to accumulate tonnages in remote areas and they will not be gathered, it is urged, unless shipping point prices are increased. Hardly much scrap may be expected, for instance, from Butte, Mont., with its unattractive price of \$1.92 for No. 2 old material. Obviously, if scrap hungry steel districts are going to remain unfed, it is idle to

# Washington

BY L. W. MOFFETT

*Washington Editor*

• House Military Affairs Committee defense report hits bulls-eye but no one knows what “prize” will be . . . Outstanding criticism deals with divided authority of defense program heads . . . OPM men said to have resigned in scrap price dispute.

talk of wide-scale ingot capacity expansion.

Defense under a single head would dispose of these frictions in short order just as the WIB once it had undergone the pains of organization functioned efficiently and expeditiously. Being a human organization it did not work perfectly but its accomplishments have been the object of tributes both in this country and abroad. Its counterpart is badly needed.

The reorganized OPM points to greater centralization. Setting up industry advisory committees and commodity sections promise to expedite the defense program. World War service committees did good work and the new OPM set up appears to be comparable to these old committees.

But the OPM reorganization is only a relatively minor change. It is not at all a primary change.

Until a sweeping change has been made and it can be made only by the President, fumbling in the defense program will continue. Whether the President will throw aside a curious prejudice against setting up a thoroughly centralized, single-head defense agency is yet to be seen.

#### Washington

• • • Department of Justice officials have been directed to institute condemnation proceedings to acquire immediate possession of four sites, recently announced, for new United States Army Ordnance projects. They are: Montana-Parsons Ordnance plant, Parsons, Kan.; Louisiana Ordnance plant, Minden, La.; Southwestern proving ground, Hope, Ark.; Texarkana or Lone Star Ordnance plant, Texarkana, Tex.

The demand for immediate possession will be based on the existence of a national emergency and the necessity for starting work on these plants at once in the interest of national defense. The \$35,000,000 Montana-Parsons, the \$29,000,000 Louisiana and the \$45,000,000 Texarkana or Lone Star Ordnance plants will be shell-loading plants, while the \$15,000,000 Southwestern proving ground at Hope, Ark., as its name implies, will be a testing ground for ammunition, similar in character to the Jefferson proving ground at Madison, Ind.

The area involved in the condemnation proceedings amounts to 102,448 acres, of which 16,000 acres comprise the Montana-Parsons site, 43,460 acres constitute the proving ground in Arkansas, 15,500 are



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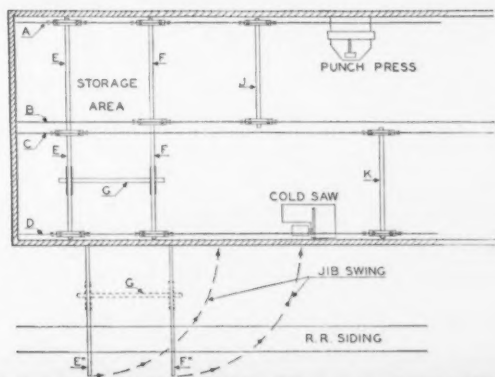
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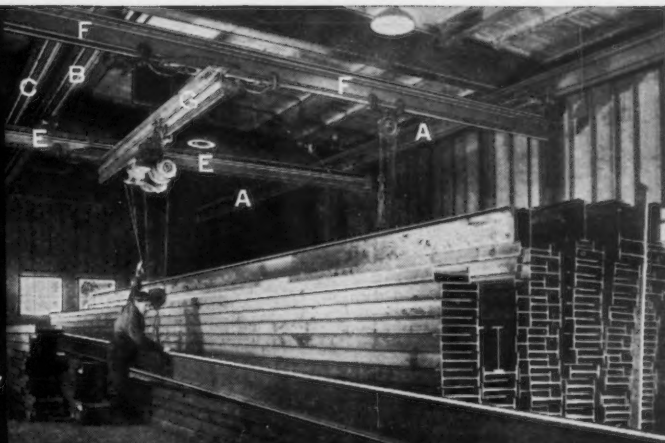
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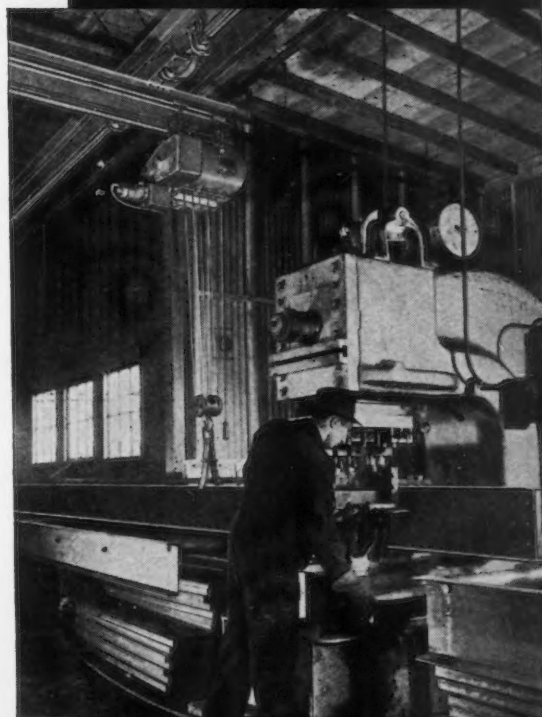


Layout of shop showing 3-level MonoRail System.

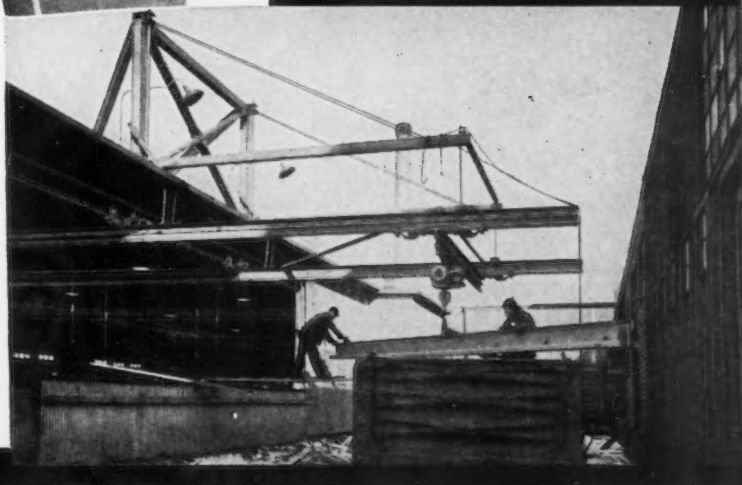


Criss-cross or 3-level American MonoRail System stores steel taken direct from gondolas. (Letters on equipment correspond with those on layout below.)

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In unloading or loading parallel jibs (E' and F' on layout) are swung out from building interlocking with tracks (inside) carrying MonoRail bridge equipped with electric hoist . . . unloads and stores without rehandling.



contained in the site for the Louisiana Ordnance plant, and approximately 25,480 make up the site for the Texarkana plant. Another 14,000 acres, west of the Texarkana plant, will be acquired later for a munitions depot.

### Steel Grain Size Unrelated To Toughness, U. S. Tests Show *Washington*

• • • A series of notched bar tests of a medium-carbon forging steel at different degrees of heat in which technicians used different grain sizes convinces the Bureau of Standards that there is no relation between grain size and toughness of steel.

Results showed, the bureau said, that each individual heat of a medium-carbon forging steel has an inherent resistance to impact peculiar to that particular heat, and that this impact resistance is dependent upon factors not at present recognized.

While finding it impossible to



*Photo by International*

**MACHINE GUN PLANT:** Col. J. L. Ralston, Canadian defense minister, inspects a Canadian Bren machine gun plant in which many men workers have been replaced by women.

correlate the effect of grain size and heat treatment with the impact-toughness of steel, bureau experts reported that the range of temperature through which most steels lose toughness is "a reliable criterion of the relative toughness of steels—the lower the temperature at which toughness is lost, the better the steel."

### Priorities Division Opens Six New Field Offices

*Washington*

• • • OPM's Priorities Division has opened six new field offices with the following district managers in charge:

St. Louis.—Louis E. Crandall, former president of Simmons Hardware Co., St. Louis, and one-time vice-president of Wickwire-Spencer Steel Corp., New York.

Denver.—V. L. Board, electrical engineer and member of the Denver Planning Commission.

Detroit.—Walter Hall, former engineering and sales department employee of Timken Roller Bearing Co., Dodge Brothers, and Cadillac Motor Car Co., was commissioned in the Ordnance Department in 1940 and stationed at the Ravena, Ohio, ordnance plant.

Cleveland.—W. Thomas Walker of Shaker Heights, Ohio, has been engaged in sales and production work in connection with aluminum foundries.

Dallas.—J. Burke Crockett, civil engineer and general contractor in Tennessee, Oklahoma and Texas.

Pittsburgh.—Charles F. Cruciger, formerly with Spang, Chalfant & Co., Inc., Pittsburgh pipe manufacturers.

District managers have been named by OPM to aid manufacturers seeking information on the operations of the priorities system.

### THE BULL OF THE WOODS

BY J. R. WILLIAMS





## Emergency Allocation of Canning Machinery Ordered

Washington

• • • **Emergency allocation** of material and equipment necessary for construction and repair of machinery needed by the canning industry to handle this year's crop of perishable vegetables and fruits has been ordered by the OPACS Civilian Supply Allocation Division. Action was taken through issuance of a civilian allocation program to be administered, enforced, and limited by the OPM. The purpose is to avoid loss of a part of the year's crop because of shortages of canning equipment, thus aiding in the maintenance of civilian supplies of needed food-stuffs.

The program provides that deliveries of equipment and material, now on the Priorities Critical List necessary for construction and repair of machinery in various parts of the canning industry shall be given emergency preference ratings to the extent found consistent by OPM with the defense program. The program applies to orders manufacturers have on hand calling for delivery on or before Aug. 1 and actually to be shipped not later than Aug. 15.

## Repairs and Maintenance Given Priority by OPACS

Washington

• • • **OPACS on Tuesday** gave priority status to repair and maintenance materials required for 26 industries and services whose continued operations are considered essential. Briefly, the program aims to allocate such materials and equipment prior to all other civilian requirements and even prior to defense requirements to the extent consistent with the defense program as determined by OPM.

The initial civilian allocation covers these classifications, among others: Railroads, electrical energy production and distribution, gas production and distribution, farm equipment employed in farming operations, mining and quarrying, coke converting, metallurgical plants engaged in the production of raw materials, production of chemicals, industrial and academic research.

# Attention



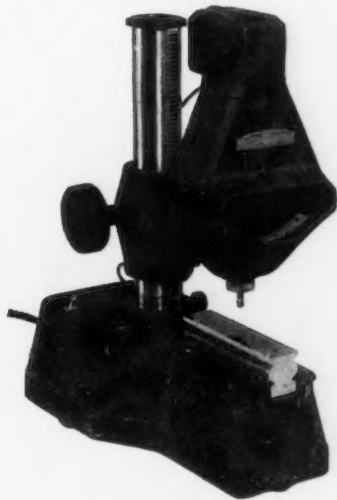
The attention of industry is being called emphatically to the urgent need for accurate and rapid inspection at tolerances never before encountered in a period of rapidly expanding production.

In order to handle this tremendous volume of gaging operations with the highest degree of precision, gages such as the Sheffield Visual Gage are absolutely essential. The Visual Gage is highly sensitive, instantaneous in its action and deadly accurate (checking to thousandths, "tenths" and millionths of an inch). It is used for checking dimensions of manufactured and purchased parts, tools, production and master gages.

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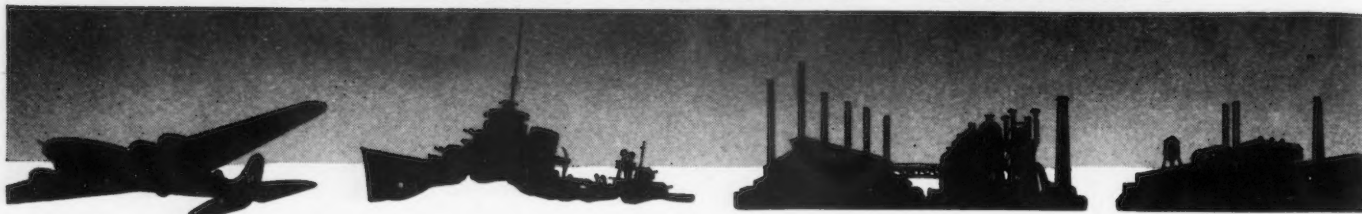
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# ON THE WEST COAST



**S**AN FRANCISCO—Even when Henry J. Kaiser, the Paul Bunyan of heavy construction, had to discover for himself when the next step of his 20 league boots was going to take him, he made some remarkable strides.

Now, with a publicity-created fan mail bringing on revolutionary processes almost daily, with Uncle Sam willing to pay the train fare on many junkets, and with Secretary Harold Ickes in need of new industries to further tax the power facilities of his Bonneville-Coulee power system, it's getting to be quite a problem for Mr. Kaiser to know where to jump next. If there should be a breakdown in a multi-million dollar project along the line, the problem would become doubly vexing.

## New Magnesium Plant Proposed

Secretary Ickes, through Administrator Paul J. Raver of the Bonneville Power Administration, announced last week that the chemical engineering division of Kaiser's Todd-California Shipbuilding Corp. had requested that 40,000 kilowatts of power be reserved until September 30 with which a magnesium plant to be erected in the Pacific Northwest might be fed. According to Mr. Ickes, the application bore the curious stipulation that the plant would be "contingent upon the successful operation of the initial unit of a magnesium plant which the corporation is now erecting at Permanente, Calif." The Permanente plant, which is expected to begin operations in August, was built with the aid of a government loan of somewhat over \$9,000,000. Metallic magnesium was to be obtained through a new process, never before tried in this country, in which magnesite ore is burned to obtain pure magnesium oxide and the magnesium oxide reduced to metallic magnesium.

The tone of contingency from such an enthusiastic embracer of

• Plant expansion in Pacific Northwest continues with a proposed magnesium plant, a flying boat assembly plant, and Foundry enlargements . . . OPACS revised price schedule confirms practices of Pacific Coast steel sellers.

new processes as the Bonneville Administration comes as something of a surprise, particularly when Uncle Sam's other hand is digging into his pocket to back financially the Permanente enterprise. Not long over a year ago the Bonneville Administration envisioned the growth of a great new Pacific Northwest steel industry when the Sierra Iron Co. announced plans to reduce local ore with low grade coal. This plan was never consummated.

Warily, Administrator Paul Raver stated that the Kaiser request would be taken up with the Office of Production Management and "other interested federal agencies immediately."

"Upon receiving assurances from these agencies that arrangements for your construction of a magnesium plant in the Northwest will be consummated promptly when your Permanente plant is in successful operation, we will reserve for you 35,000 kilowatts and hold it for you until September 30, 1941" he wrote the Kaiser-dominated Corporation. "This should be ample for a 12,000 ton plant, at least in the initial stages."

The wording of the letter would indicate either that Administrator Raver knew better than the plant's

operators how much power would be required or that the heavy demand for power between now and next spring was beginning to pinch. Although the ultimate power to be developed from Bonneville-Coulee will be ample to meet all demands, it is probable that the Administration will have to call on hated private and municipal power producers to carry part of the load until at least the middle of 1942.

If Mr. Ickes' henchmen had doubts that the Permanente plant would be in operation next month, Mr. Kaiser's associates were taking no chances.

## Sea Water Extraction Considered

As a possible alternate source of magnesium oxide in place of Nevada magnesite, Kaiser engineers were investigating the waters of the blue Pacific at Half Moon Bay, Cal., across a spur of the Coast range mountains from Permanente. No definite plan has been announced for a sea water extraction plant and the Kaiser office emphasizes it is "merely being considered." The \$150,000,000 West Coast steel plant proposal may be dead, but the possibilities for production of magnesium are endless.

## New Boeing Assembly Plant

At Seattle last week, Boeing Aircraft Co. announced plans for immediate construction of a flying boat assembly plant which would bring its floor space to nearly ten times that existing before the emergency. The new plant is to be Navy sponsored, and operated by the Boeing Co.

The new plant will be located in the city of Renton, Wash., at the south end of Lake Washington, several miles from the company's present plant. It will afford 1,617,000 square feet of floor space, an area nearly as large as the company's main Plant No. 2 in Seattle,



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New developments incorporating Twin Disc Hydraulic Drives are making past production records obsolete. Twin Disc Torque Converters are increasing the daily output in logging camps 15% to 20%. In the oil fields, Hydraulic Drives are speeding up drilling, lengthening the life of tools and equipment. Railcars equipped with Torque Converters are setting up new standards for economy, speed and passenger comfort. If you employ an internal combustion engine to power your equipment, you should investigate Twin Disc Hydraulic Drives. Complete description and illustrated applications are shown in Bulletin I-132. Ask for it on your business letterhead. TWIN DISC CLUTCH COMPANY, 1370 Racine Street, Racine, Wisconsin.

*Illustrated: Left, Hydraulic Torque Converter and right, Hydraulic Power Take-off.*



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headquarters for Boeing Flying Fortress production.

Activities of the new plant will be confined chiefly to sub-assembly and final assembly operations. Fabrication of detail parts will be handled by the Boeing Plant No. 2, Seattle, the Stearman Aircraft Division's Plant No. 2 in Wichita, Kansas, and by subcontractors in the Pacific Northwest.

The main assembly building will have three sections with unobstructed area of 300x650 feet with nearly 45 feet of overhead clearance. Total floor space of the main assembly building will be 900x1100 feet.

As a flying boat plant, the site has the advantage of being on a fresh water lake, free from high winds, tides, current, and the effects of salt water corrosion.

The Renton plant will be the third major production unit of the Boeing Company erected since the start of the national defense emergency. The others are Plant No. 2, Seattle, enlarged in the past year from 166,000 to 1,816,000 square feet, and the Stearman Plant No. 2 in Wichita, started last fall and now being enlarged to 1,704,600 square feet. Both of these plants are used in the production of Boeing Flying Fortresses. With the addition of the flying boat plant, Boeing will have a total of 6,432,000 square feet or 147 acres of floor space devoted to defense production in Seattle, Renton, Wichita and Vancouver, B. C.

#### Seattle Foundry Expansion

Announcement by the Office of Production Management of enlarged West Coast steel production facilities embodying a large foundry expansion by Pacific Car &

Foundry Co., Seattle, will go far toward relieving Boeing of dependence on the East for heavy castings. Pacific Car & Foundry Co. operates the largest steel foundry in Oregon or Washington, but they are unable to handle castings weighing over seven tons. The present foundry equipment is outdated, and not suited to modern production. Until recently, most of the firm's operations were concentrated in the fabricating division. It is understood that Boeing's Flying Fortresses involve many integral castings weighing over seven tons, all of which have to be poured in the East and shipped to the Coast all-rail at high cost. The new Pacific Car expansion will make this unnecessary.

Not yet officially announced is a large expansion in southern California by Douglas Aircraft.

#### Steel Pricing System Confirmed

Action by Administrator Leon Henderson in revising price schedule No. 6 on iron and steel products confirms pricing practices of Pacific Coast steel sellers unable to obtain cargo space for intercoastal water shipments. The OPACS revision of June 21 permits producers to use a basing point system for Pacific Coast shipments instead of being compelled to continue use of arbitrary delivered prices at these points. The revision states that rail freight rate may be charged where water transportation is no longer available, and that sellers are now permitted to compute delivered prices in terms of basing point price nearest the mill where steel is produced.

Necessity for such official revision had been felt ever since vessels began to be withdrawn from

the intercoastal run with consequent increase of all-rail steel shipments. Producers have been unable to absorb rail freight charges to such an extent as to meet published Pacific Coast delivered prices, and the policy now blessed by Mr. Henderson has been generally followed for all-rail shipments. The revision by Mr. Henderson of the official price pattern to conform with a clause making it retroactive to April 17 when the original schedule was issued, does not mean acceptance of a new practice. Although demand for all-rail shipments was rare before the defense emergency, such shipments were always priced f.o.b. Eastern points.

Pacific Coast ship operators are now waging a strong campaign to have shipments to Suez routed via the Pacific. They point out that the distance from Pacific Coast ports to Suez, via Singapore, is less than 100 miles more than that from New York to Suez, via the Cape of Good Hope route. The Pacific route has a further attraction in that the vessels are able to pick up return cargoes of rubber and tin from the far East and in its freedom from German raiders. If the government were to strongly endorse shipment by the Pacific route, it would mean a boost for Western industry. Preference would be given to the products of Pacific Coast factories to avoid the long transcontinental haul.

Casualties of firms hastily organized to share in defense contracts are increasing in the Los Angeles area. Long periods of operation at a loss necessary to qualify for government orders have proved a fatal potion for several firms representing investments from \$50,000 to \$100,000.



WHERE TIME really is of the essence: The Douglas Aircraft plant at Santa Monica, Cal.



## ARE YOU OVERLOOKING THIS POWERFUL PRODUCTION TOOL?

The problems of increased production are so many and varied that simple solutions are often hidden and difficult to perceive.

Obviously, it is necessary to squeeze every ounce of production efficiency from existing tools and machines. This can best be accomplished when cutting fluids are seriously recognized as a factor of prime importance.

Perhaps you have overlooked the useful developments in the field of cutting fluids that have accompanied improved machine and tool designs. The importance of such developments is evidenced by the interest in intensive research under way in the laboratories of leading universities and machine tool manufacturers.

When a plant door is unwittingly closed to the results of scientific progress in the field of cutting fluids and cutting fluid applications, its production executives are neglecting to use a valuable and immediately available working tool.

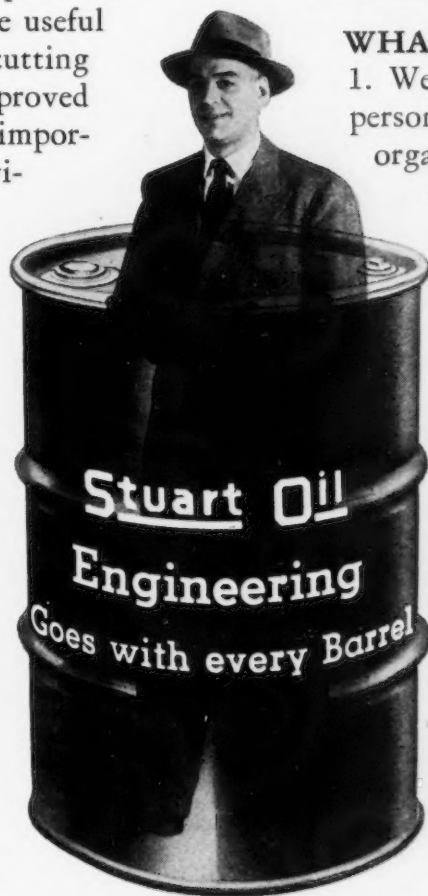
As a production executive interested in getting more out of existing tools and machines, by eliminating such superfluities as tradition, reciprocity, etc., will you consider the following suggestions? They may solve your problems.

### WHAT YOU CAN DO ABOUT IT!

1. Encourage your purchasing agent to consider bona fide new cutting oil developments. Ask him to open the door wide to the qualified vendors possessing the all important credential of well founded information on the lubrication problems of today.
2. Remind your factory manager, superintendent or test engineer that the policy of trying out well recommended cutting oil products can be of vital importance and may quickly open up bottlenecks in the road to increased production.
3. Suggest to your metallurgist that machinability troubles can frequently be cured by

getting the right cutting oil to fit the job, preferably selecting one with a sufficient factor of safety to provide for occasional metallurgical irregularities.

4. Inform your tool engineer that when deliveries of small tools are slow or difficult to obtain, it may be that the opening of the door and the help of a qualified cutting oil engineer may prolong the life of the tools on hand, thereby reducing appreciably this particular bottleneck in a quick and simple way.



### WHAT WE CAN DO ABOUT IT!

1. We can through an informed and alert personnel immediately present to your organization timely information covering the most efficient cutting oil applications for ALL metal cutting operations. At the present time the problems involved in the manufacture of gun barrels and mechanisms, military tanks, ammunition, airplane engines and other similar items are, because of the emergency, particularly important.
2. We can present to you complete cutting oil research facilities, together with broad practical experience gained from working hand in hand with the manufacturers of small tools, builders of machine tools and makers of alloy steels.
3. We can give you the benefit of years of experience in supplying cutting oil products and cutting

oil engineering service to the largest consumers in the most highly competitive industries. We are today providing government manufacturing plants (armories and arsenals), airplane engine builders, and the earlier manufacturers of munitions with a quality of cutting oil products and a specialized cutting oil applications service that saves tools and speeds up production.

YOU OPEN THE DOOR—WE WILL SERVE YOU WELL

★ ★ ★

**D. A. STUART OIL CO.**

LIMITED • Est. 1865

2727-2753 SO. TROY STREET • CHICAGO, ILL.  
Warehouses in Principal Metal Working Centers

# Fatigue Cracks

BY A.H.DIX

## Post-Mortem on Elsie

You say Elsie, the Borden cow, was struck just north of Rahway, and killed.

I have chased cows in the black of the night, being late in the milking chore. I have played cowherder to keep them out of the corn. I have fed them the juicy ensilage that feels so good on your feet on a bitter winter A. M. around sunrise.

I have extracted the lacteal fluid from many a cow, and have been kicked by many for my efforts, but never, not in over fifteen years of close association with distant relatives of Elsie, have I ever known what part of a cow is called Rahway.

—Walter A. Allen, New Haven, Conn.

Right is Reader Allen. A stock-model, unsuper-charged cow was Elsie, with nothing but standard equipment. Rahway, a stranger to ruminant anatomy, is a city in Union County, N. J., 20 m. w. of N. Y., pop. 16,011.

## Heat Wave

••• An anonymous downeaster sends us a postcard reading:

It troubles me these days about the cent to live and enjoy your paper and protect myself by the talent I have. By taxes it's the kind of persons robs Peter to pay Paul. If I could only be boss. I don't get only raps to gain in knowledge. In history its said the loud man is no better than the silent.

People with bald spots should always wear a hat in the hot sun.

## Five-Year Fadeout

••• The Montgomery Shoshone Consolidated Mining Co. sends a notice to an IRON AGE editor who has been with the angels for the past quarter century, and directs it to an address your favorite family journal left during the era when peg top trousers were in flower.

It is, of course, no new thing for the custodian of a mailing list to feel that his charges are exempt from actuarial laws. Which is why an enterprising typewriter ribbon manufacturer could confer a boon on the business world by producing a ribbon, for use in typing mailing list cards, guaranteed to fade to invisibility in five years.

## He Had a Line

Just to keep the subject to the ground, Capt. Sumner evolved his line in 1837 not 1937. Whereas Marc St. Hilaire's method was academic (he was a monk who never saw the sea), Capt. Sumner's was worked out at sea and of sheer necessity while being threatened with disaster on a lee shore. It is all told right prettily in Bowditch, American Practical Navigator, a weighty tome on which many a sailor has cut his teeth.

—B. H. Thompson, Waterbury, Conn.

## Anything to Be Different

••• While we are on a nautical tack, we might mention that Bill Phair, of the brains department, who owns a 198-in. yacht, tells us that in the jib-and-hard-alee set the word *tackle* is pronounced *tay'-kull*.

## Aptronyms

••• To our names-that-sound-like-the-job collection Frank Oliver, our machine tool editor, contributes the treasurer of the H. L. Judd Co., manufacturer of household accessories—a Mr. Price.

Just fair. We are far more excited to learn that Saks Fifth Avenue's corset specialist is a Mrs. Large.

Our favorite is John C. (National Industrial Advertising) Stephan's discovery that a Massillon, Ohio, barber shop is run by Charles E. Rasor.

## Airbrake

••• Recently we informed you that Miss Martha Hopp is an airplane hostess. We now learn that an American Airlines hostess on the Chicago-New York run is Miss Alice Goodbrake, who obviously belongs on a Greyhound bus.

## Pun Parade

••• And that brings up the current run of puns in the ads. American Airlines advertises "Isn't it great to be on American!" Jantzen labels one of its beautifully-but-tocked bathing girls "Beauty on the beach." But the ceiling is reached by Brimabright Ltd., Birmingham, England, manufacturer of light alloys, which captions a page ad in *Aircraft production*, illustrating an aerial dogfight, "Goering, Goering, Gone!"

## Stoppers

Can you drown a motor?—Allis-Chalmers.

Treachery in your plant—Fairbanks-Morse.

The Navy sharpens its teeth—Michigan Tool Co.

We see that the title of your favorite family journal's May 1 editorial, "The Town is Full of Strangers," made the stopper column in *Tide*, the advertising journal. Incidentally, the heavy demand for the booklet of 30 recent editorials by John H. Van Deventer, our editor, has reduced our stock to two dozen copies. If you want one send 25c. in stamps to us at 100 E. 42nd St., New York.

## Etymological Vacuum Filler

••• The widely advertised injunction "Accept no substitute" has given the word *substitute* an unpleasant connotation, which is too bad in these days when it is so frequently a matter of finding a substitute material or shutting up shop.

Obviously a euphemistic synonym is needed. "Alternative material" would do, but it is too long and sounds prissy.

The Aluminum Co. of America wrinkled its brow, scratched its head, went into the silences and emerged with the coined word *necessities* to apply to the things which industry is using during the recess when defense needs make it impossible to supply aluminum for all requirements.

The word is an ingenious invention, and although Alcoa conceived it for its own use, so great is the need for a substitute for *substitute*, that *necessity* might strike the popular fancy, and go through industry, like, to coin a cliché, wildfire.

## Puzzles

Our puzzle book shows that last week's farmer can divide his 14 quarts equally in 13 operations. If you can do it in less we would like to know how.

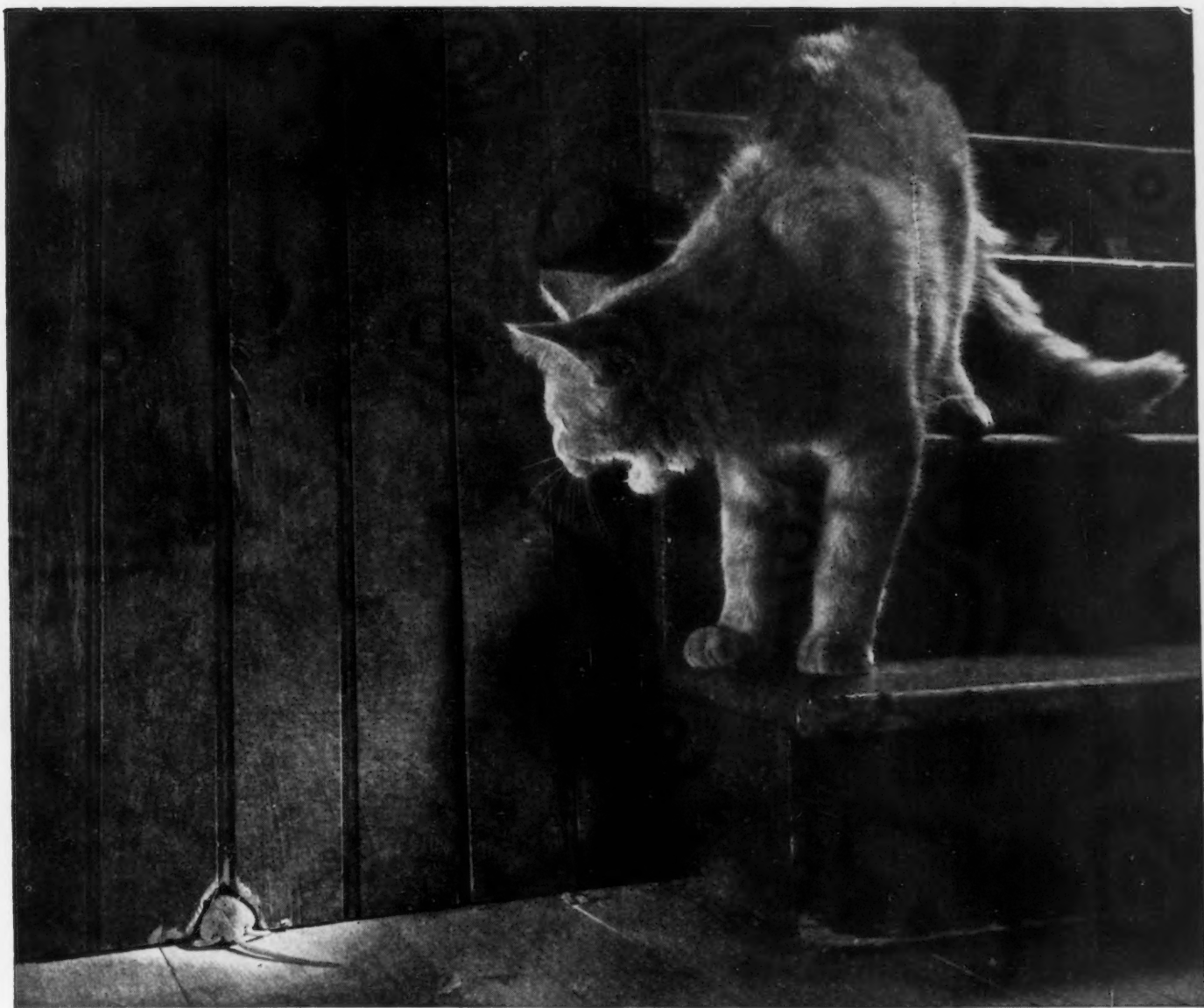
By telling us only a part truth, our puzzle book deceived us in connection with the June 26 problem, the one requiring that the value of  $\frac{1}{6}$ th be expressed by using the digits 1 to 9 each only once. The answer given last week, 9321/74568, is correct, but it is only one of the correct answers. The master minds figured out a whole hatful. Lt. Commander A. R. Simpson submits 9541/76328, Thomas Abraham 6789/54312, George Benoit 3187/25496, William Flannery 7416/59328, B. H. Hawkins 12345/9876, John W. Gibbons 7312/58496, and "Jack Canuck" of Montreal

$$\frac{1 + 2}{3 - 4 - 5 + 6 + 7 + 8 + 9} = \frac{1}{6}$$

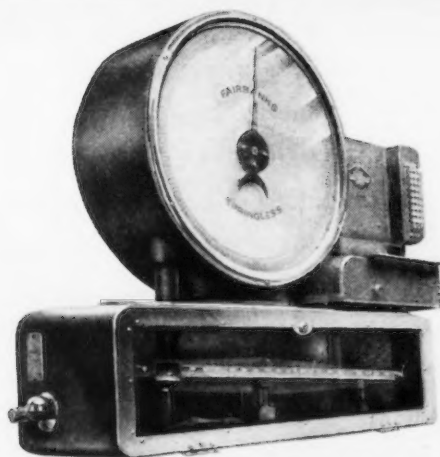
The following, submitted by Lt. Commander Simpson, may not give you a nervous breakdown but it will help:

A farmer divides a bin of potatoes among his four sons and five grandsons, as follows: (1) Farmer takes  $\frac{1}{5}$  of the potatoes for himself, and finds one left over, which is given to the pigs. (2) The first son gets  $\frac{1}{5}$  of the remainder, and one potato is left over for the pigs. (3) The second, third, and fourth sons, each in turn, take  $\frac{1}{5}$  of the remainders, and after each division have one left over for the pigs. (4) When the sons have had their shares, the remainder is divided equally among the five grandsons, and one potato is left over for the pigs. How many potatoes were there originally, assuming that the number is the smallest which will fulfill the conditions?





## DISCOVERED!



*The application of Fairbanks Scales to weighing problems is vastly extended by the use of photo-electric cells, automatic printing devices, limit switches, and other electric control mechanisms.*

● The bigger they are, the easier to catch. It's the small causes of repeated losses which are hard to discover.

Inaccurate weighing often causes only a negligible loss *each time*. But the total *by the year* can be of staggering importance.

Experienced Fairbanks Scale men quickly find the causes of inventory losses due to inaccurate or careless weighing. They can prescribe weighing methods which are faster than your present ones. They can plan for weighing to be done while materials

are actually moving. They can provide scales which *count* small parts, and scales which give printed records, or scales which automatically weigh and disburse pre-set amounts. Fairbanks Scale men can indicate many new and unusual uses of scales to save money for your plant.

For full information on these and other Fairbanks Scales, address Dept. G-38, Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill. Branches and service stations throughout the United States and Canada.

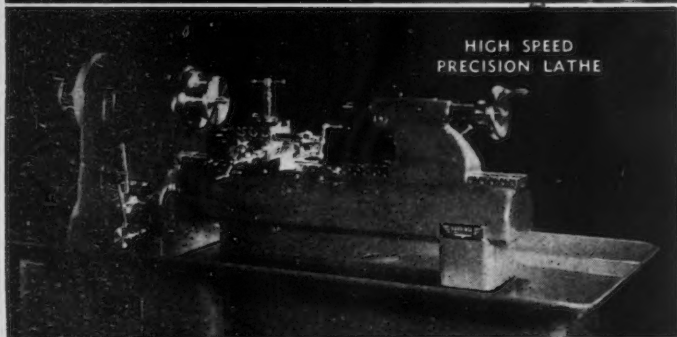
# FAIRBANKS · MORSE SCALES

DIESEL ENGINES ELECTRICAL MACHINERY RAILROAD EQUIPMENT WASHERS-IRONERS STOKERS  
PUMPS MOTORS WATER SYSTEMS FARM EQUIPMENT AIR CONDITIONERS

# HARDINGE



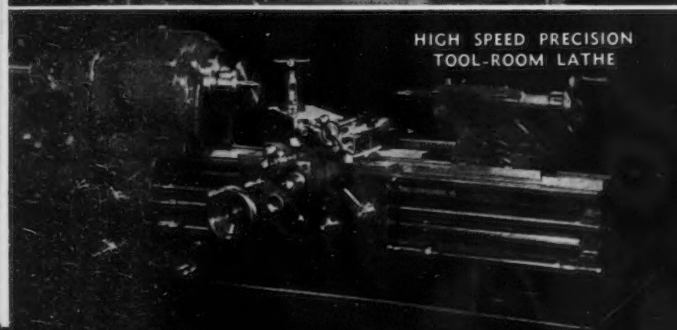
HIGH SPEED PRECISION  
SECOND OPERATION MACHINE



HIGH SPEED  
PRECISION LATHE



HIGH SPEED PRECISION  
MILLING MACHINE



HIGH SPEED PRECISION  
TOOL-ROOM LATHE

## PRODUCTION *with* ACCURACY

(No. 2 OF A SERIES)

Hardinge Precision Machine Tools combine two important requisites for production — HIGH SPEED and EXTREME ACCURACY. The high speed means greater production and better finish while the extreme accuracy is for the manufacturing standards of today and tomorrow.

The combination of high speed and extreme accuracy in Hardinge machines provides simplicity of operation to enable relatively unskilled operators to produce parts to the necessary close limits without expensive tooling.

Production is not merely quantity. It is a combination of quantity with accuracy to meet requirements for absolute interchangeability in the present system of manufacturing.

To obtain production in quantity with quality, specify Hardinge high speed precision machine tools with the Hardinge preloaded ball bearing spindle construction.

## HARDINGE BROTHERS, INC.

ELMIRA, N. Y.

"Performance has established leadership for Hardinge"





Photo by International

**IT REALLY FLIES:** The Douglas B-19, most photographed of U. S. war planes and said to be the largest plane in the world, is pictured on its first flight at Clover Field, Santa Monica, Cal.

## Shortage Reported

### Closing Small Metal Plants In N. Y. Area

••• Many small metal-working plants have ceased to operate and others probably will be forced to shut down as a result of a shortage of materials. This effect of the defense program on small plants and efforts to prevent such shutdowns were set forth last week at New York by Phillip H. McCullough, regional director of the OPM Division of Priorities.

"Because of the extremes in range of size of the companies here and the fact that so many small companies do exist in the New York area," said Mr. McCullough, "we must expect that the impact of impending shortages of materials for needs not essential to national defense will be particularly hard. The imagination and resourcefulness that we display in meeting this blow will determine to a large degree the success of the defense effort and the important part that we may play in the post war economy of our country."

"The impact is being felt right now. There are many companies

operating in this city (New York) who buy their materials in the morning, manufacture them during the day and deliver them that same night or at the latest the next morning. Many of these companies base their product on non-ferrous metals. They largely engage in non-defense industry such as costume jewelry, household gadgets, lamp fixtures or any one of many items we look upon as desirable but which would help but little a man in a tank or a submarine. The metal which goes into making these is needed somewhere else, and will go where it is needed.

"We do not let this small fellow just sink," the OPM executive said. "The Defense Contract Service tries to turn this small enterprise into the manufacture of some defense need so that it will not have to go out of business but can continue with the least dislocation of labor or capital. In those companies where the machinery is inadequate or antiquated so that it cannot be used and the materials the company cus-

tomarily uses are not forthcoming, the company may have just to cease to operate. Have no illusions about this point, there will be and are many doing just that thing right now. War is not a pleasant pastime and this is one of the results.

"We must do many things which we do not wish to do," Mr. McCullough said. "Things which we have determined over the past 22 or 23 years are costly under ordinary circumstances. War is not economical and hence we must do a great many things which are not economical in order properly to wage a war. Manufacturing and maintenance specifications must be lowered in many cases, yes, almost all cases which cover the use of scarce materials and where the use is not directly associated with national defense. Those are hard words and no one knows more than I do how cruel it is to tell plant men to lower their sights on material or maintenance."

"A few examples? Aluminum paint. Best just to eliminate it unless it is for a tank, sub or navy

boat. Even there it might be replaced. The Army and the Navy are lowering their sights as far as they can to make available a bit more zinc, aluminum, nickel, copper and other things we need so badly. They are using black pipe every day where their specifications call for galvanized. Don't get me wrong or misunderstand, if they need zinc they get it but they are willing to put in a pipe that will last but a few years because they may not need it longer and it will save zinc now."

### Subcontractors for 2 Ammunition Plants Will Exceed 25,000

•••Twenty-five thousand subcontractors in almost every industrial area in the country are helping to equip three \$30 million ammunition plants being built under the national defense program, Ordnance Department officials at Washington report.

This wide distribution of orders for the three plants was made known recently when the War Department announced the issuance of 32 letters of intent totaling \$34,908,225 for machine tools and equipment for small arms ammunition plants at St. Paul, Minn., Salt Lake City, Utah, and Des Moines, Iowa.

One of the 32 prime contracting companies has awarded 104 subcontracts and reports some of those in turn have more than 10 subcontractors each.

For these small arms ammunition plants it was necessary to order 7528 special items of machines and tools ranging in size from hand tools to 20-ton presses, practically all of delicate and precise adjustment. The process of manufacturing small arms ammunition allows smaller tolerances than many other types of manufacturing.

Under Secretary of War Robert P. Patterson, commenting upon the prompt allocation of these contracts, said:

"The Ordnance Department, by

### 32 Companies Share in \$34 Million Tool, Equipment Order

•••The companies receiving letters of intent from the War Department for machinery and equipment for three small arms ammunition plants are:

Company	Address	Amount of Award
Peters Engineering Co.	Philadelphia	\$ 1,452,250
Waterbury Farrel Foundry & Machine Co.	Waterbury, Conn.	6,971,758
Ferracute Machine Co.	Bridgeton, N. J.	1,519,813
Zeh & Hahnemann Co.	Newark, N. J.	193,050
Globe Machine & Stamping Co.	Cleveland	11,374
Standard Machinery Co.	Providence, R. I.	35,878
Carrier Corp.	New York	11,098
Hires, Castner & Harris	Philadelphia	579,967
G. S. Blakeslee & Co.	Cicero, Ill.	119,889
Colt Patent Firearms Mfg. Co.	Hartford, Conn.	426,188
Lindberg Engineering Co.	Chicago	73,597
Owens Illinois Glass Co.	Toledo, Ohio	429,282
Specialty Engineering Co.	Philadelphia	2,696
Black Rock Mfg. Co.	Bridgeport, Conn.	192,450
Canister Co.	Philipsburg, Pa.	176,537
Inman Mfg. Co.	Amsterdam, N. Y.	204,105
Proctor & Schwartz	Philadelphia	128,700
E. W. Bliss Co.	Brooklyn, N. Y.	11,126,877
Star Tool & Die Co.	Detroit	1,161,500
Spayd-Ohio Mfg. Co.	Detroit	944,300
Manistee Iron Works	Detroit	1,145,340
Heidrich Tool & Die Corp.	Detroit	597,090
N. Ranschoff Co.	Cincinnati	142,770
E. J. Manville Machine Co.	Waterbury, Conn.	372,972
Modern Bond Corp.	Wilmington, Del.	214,994
V. & O. Press Co.	Hudson, N. Y.	2,044,456
E. I. du Pont de Nemours & Co.	Wilmington, Del.	64,517
Fidelity Machine Co.	Philadelphia	471,273
Henry & Wright Mfg. Co.	Hartford, Conn.	1,233,836
Salem Engineering Co.	Salem, Ohio	2,012,177
Schutte & Koerting Co.	Philadelphia	534,189
Watson Stillman Co.	Roselle, N. J.	313,302

its foresight and planning and its ordering of these tools and machines for the three small arms ammunition plants approximately two months before the sites were selected, will expedite production by weeks and months; and time saved is a most helpful contribution to our arms program."

On May 27, the War Department awarded a letter of intent to Smith, Hinchman & Grylls, Inc., of Detroit, for architectural and engineering services for the plants. This firm, with a local affiliate in

each of the three cities, is working with the Ordnance Department and Remington Arms Co. officials in drawing the plans, machinery layouts and all other plant engineering work.

Negotiations are now under way for contracts for construction of the plants and for their operation on completion.

### Latham Machine Co. Organized To Make Gages and Tools

Pittsburgh

•••Organization of the Latham Machine Co., 128 Latham Street, Pittsburgh, has been announced by David Hoppenstand, president. The company will make plug, ring, snap and thread gages, and various types of hobs, cutters and machine tools. The plant has been newly equipped with machinery and tools as well as the latest precision measuring instruments, and is in a position to make prompt deliveries.

### Coming Events

July 23 to 26—Silver Bay Industrial Conference, Silver Bay on Lake George, N. Y.

Sept. 23 to 26—Iron and Steel Engineers, annual convention and exposition, Cleveland.

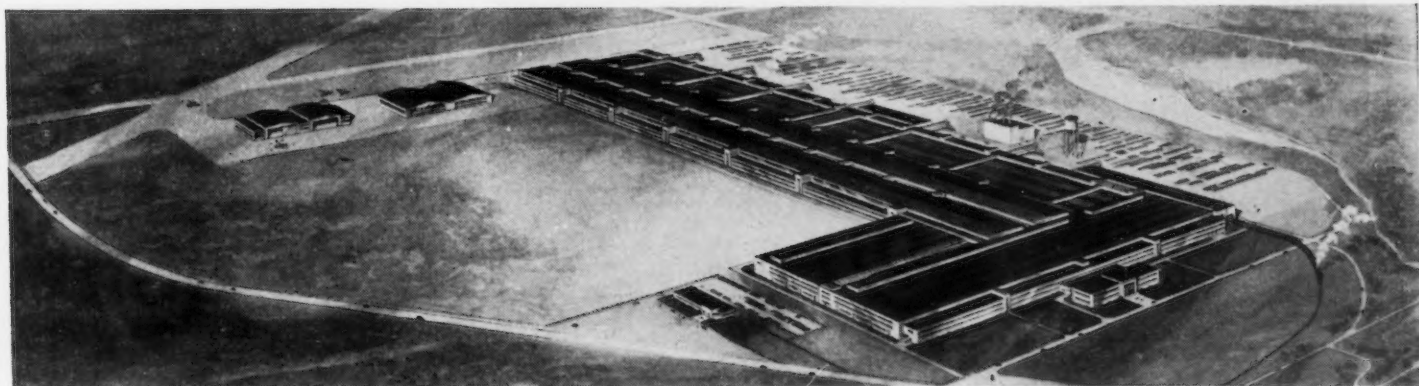
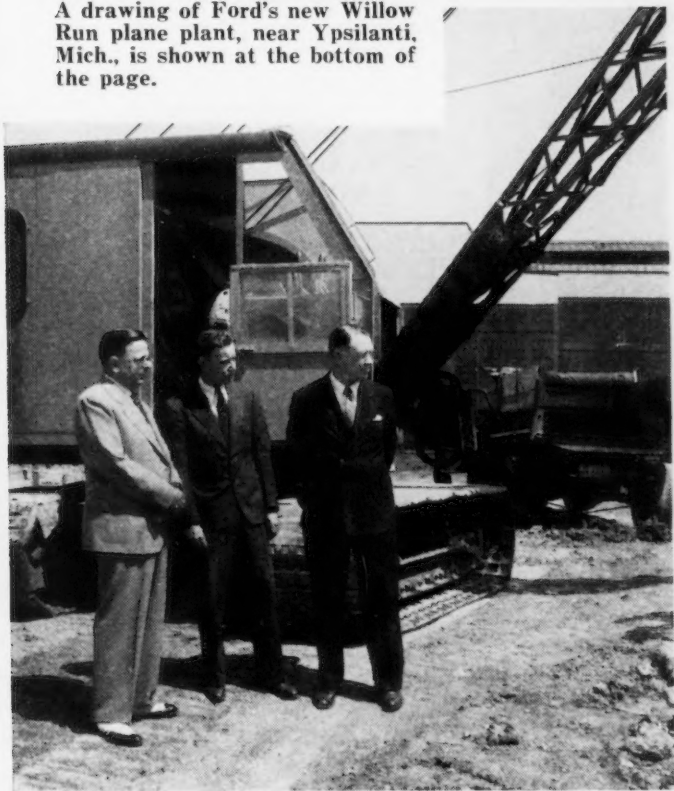
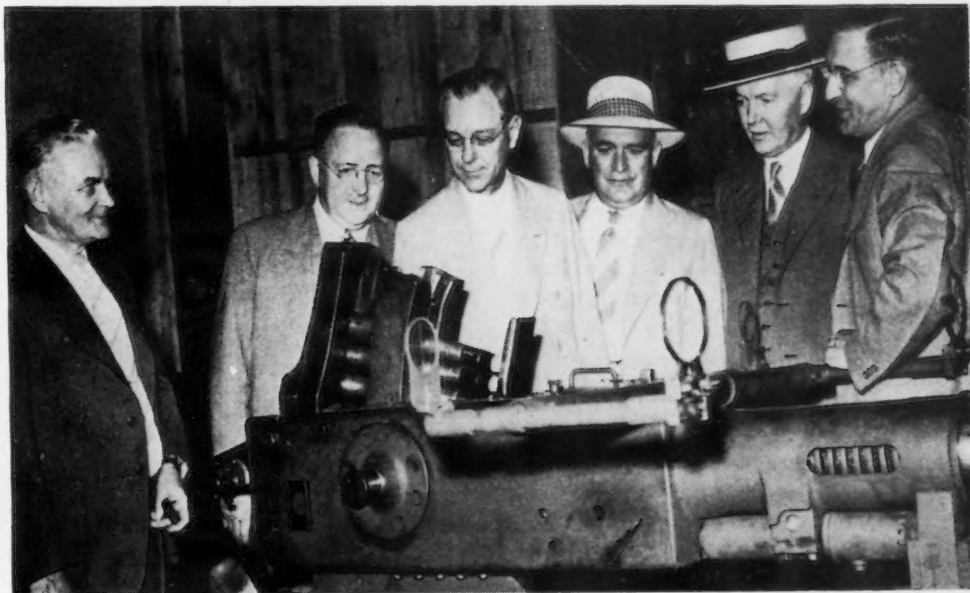
Oct. 1 to 4—The Electrochemical Society, Fall Meeting, Chicago.

Oct. 20 to 24—National Metal Congress, Philadelphia.



## Detroit Enlists

Results of the shifting of big automobile companies into defense production are already appearing, as in this Bofors 40 mm. rapid fire anti-aircraft gun (photo at right) just completed by Chrysler two weeks ahead of schedule from drawings started Feb. 1, 1941. Inspecting De Soto's new plant (left center, l. to r.) for making gun and bomber parts are C. E. Bleicher, De Soto vice president; L. R. Anderson, gun part manager, and George Rumford, De Soto automobile plant manager. Chrysler executives (right center photo, l. to r.) David A. Wallace, president of Chrysler Sales Division, Henry E. Watterson, plant engineer, and Charles L. Jacobson, sales vice president, are breaking ground for a new plant to manufacture antiaircraft guns. A drawing of Ford's new Willow Run plane plant, near Ypsilanti, Mich., is shown at the bottom of the page.



## 37 Fewer Dayton, O., Plants Report Idle Machine Capacity

Dayton, Ohio

••• A new survey of machinery available for defense production here shows milling, screw machine, shaper and planer capacity less idle than in January of this year, according to Paul W. Williams, managing director of the Dayton Chamber of Commerce. More firms are now engaged in defense production at capacity.

Machinery available in May,

1941, included 96 lathes, 80 drill presses, 40 millers, 26 screw machines, 38 punch presses, 19 shapers, 44 grinders, 9 radials, and 4 planers.

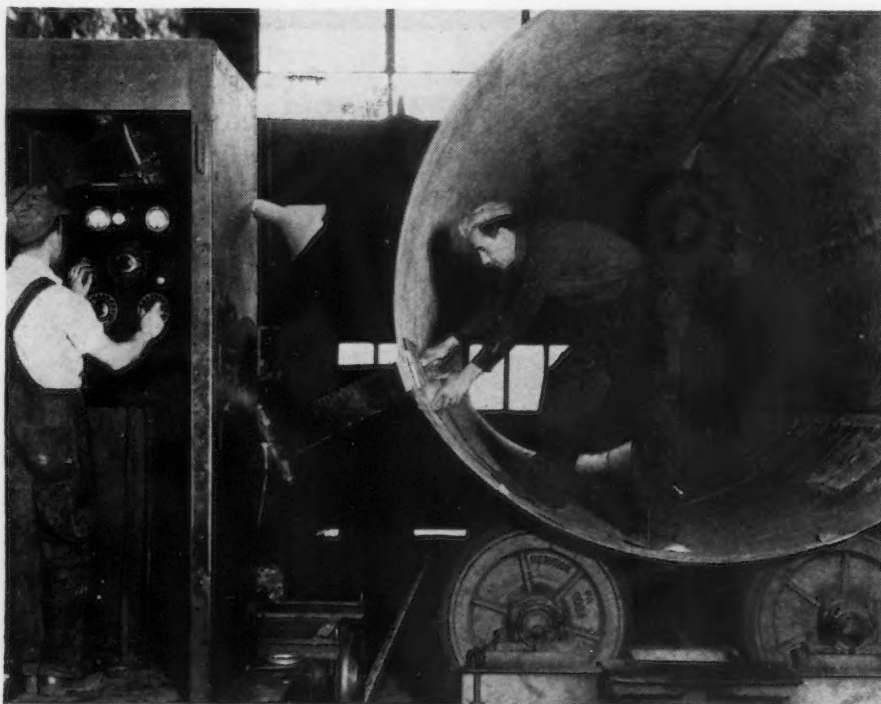
The latest survey, undertaken by Elwood Zimmer, director of the Chamber's business research department, showed that 43 out of 75 firms had available machine capacity. In January replies were received from 113 firms of which approximately 80 had machinery available.

The lesser number of replies and the lesser number of firms available for defense production indicated that the first survey had

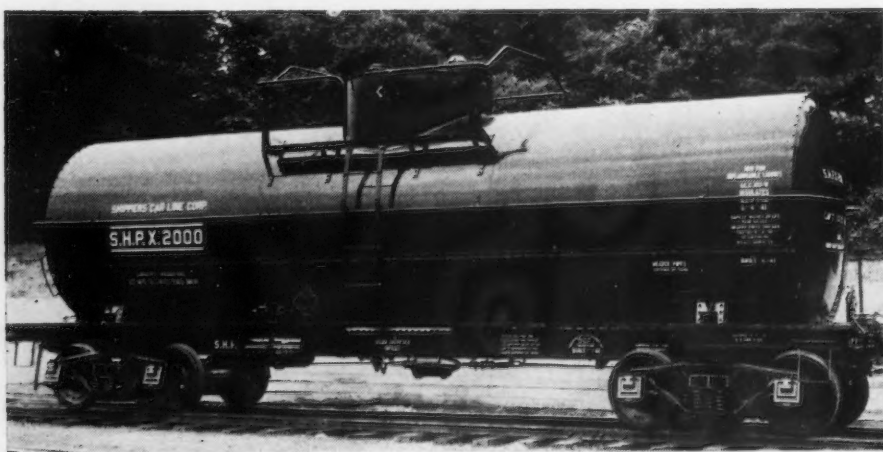
been successful in obtaining business for the area, said Mr. Williams, who pointed out that THE IRON AGE carried a nationwide story on Dayton's efforts to secure subcontract work and also that the result had been listed with the OPM in Washington. Approximately 50 inquiries were received, some from Philadelphia, Pittsburgh, Cleveland and other cities.

One important feature of the latest survey, according to Zimmer, was an effort to determine the amount of floor space available for further defense production. Twenty-four firms indicated that they had a total of 416,200 sq. ft., available for further defense production and for the installation of additional machinery.

Priorities and a curtailment of strategic materials of which there are now over 400 on the critical list will cause in the next few months a radical change in many Dayton businesses and the Chamber is calling to the attention of Dayton firms whose business might be injured in this process, to think more and more of changing over to at least a portion of defense production, stated Mr. Williams.



FIRST ALL-WELDED tank car made of Lukens nickel-clad steel at the Milton, Pa., plant of the American Car & Foundry Co. (shown in the lower photo), has a capacity of 10,000 gal. The top photo shows workmen making an X-ray of welds.



## Labor, Defense Problems to Be Discussed at Silver Bay

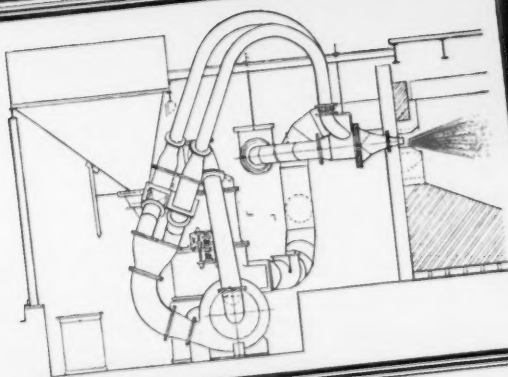
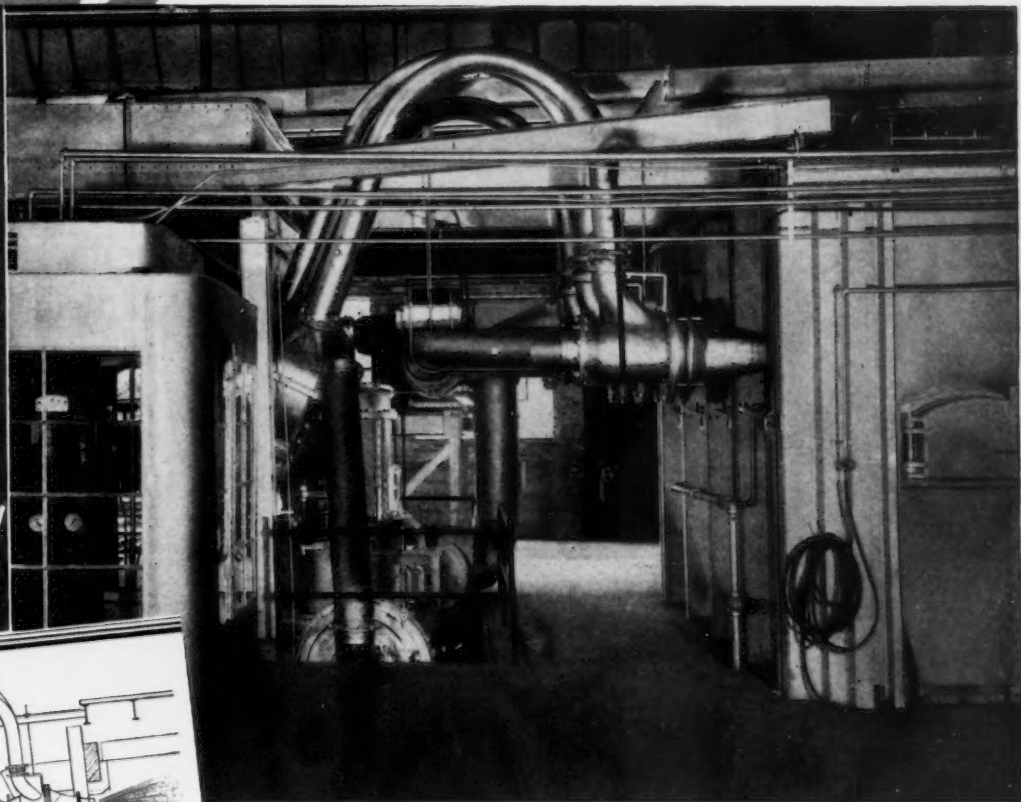
••• The problem of better industrial relations for national unity will be discussed at the 24th annual Silver Bay Industrial Conference to be held July 23-26 at Silver Bay, on Lake George, N. Y. Among the topics covered will be: "How Defense is Changing Our Industrial Relations Responsibilities," by Thomas R. Jones, president, American Type Founders, Inc.; "Attitude of Organized Labor Toward Mediation, Conciliation and Arbitration," by Ralph D. Hetzel, Jr., director, CIO economic division; "Today's Trends in the Cost of Living and the Distribution of Income with Particular Attention to Wages," by Donald D. Lescoghier, chairman, University of Wisconsin department of economics; "What's Ahead for Management and Labor," by William Hard, Washington correspondent; and "Methods for Training Workers Quickly," by L. W. Moseley, personnel manager, Electric Storage Battery Co.



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like natural gas!*

Begin now  
to replace  
natural gas  
and oil ...  
*to avoid delays!*



AMCO now provides installations with com-  
pletely automatic furnace temperature and ratio  
controls, thus modernizing the use of pulverized  
coal for most heating and melting operations.



*The* **AMSLER-MORTON COMPANY**  
FULTON BUILDING • PITTSBURGH, PA.

## 11,000 Men Added to Steel Payrolls in May

••• Almost 11,000 new employees were added to the steel industry's payrolls during May, raising employment in the industry to a new peak of 632,000, according to the American Iron and Steel Institute. The previous peak of steel employment was the April total of 621,000. In May a year ago, the industry had 510,000 employees,

indicating a 25 per cent rise in employment in the past 12 months.

Steel payrolls during May totaled \$115,267,000, compared with \$108,557,000 in April and with \$75,184,000 in May, 1940. Wage-earning employees earned an average of 98.1c. per hour in May, and worked an average of 39.7 hr. per week.

Hourly earnings of wage-earners averaged 97.4c. in April and 85.1c. in May of last year while the average work-week was 39.4 hr.



THESE  
*Spiral Wound*  
**BRUSHES**  
Will Help You Do It!

● Pittsburgh Plate Glass Company's Spiral Wound Brushes are saving money for manufacturers of light gauge metal. By stepping up production—by reducing finishing costs—by providing a product of more uniform quality.

Investigate! Consult with our field representatives. These men are trained tech-

nicians who thoroughly understand finishing problems. They will gladly work with you in developing Spiral Wound Brushes—of horsehair, nickel silver wire or tampico—to meet your specific finishing requirements.

Write, wire or phone for further information.

**PITTSBURGH  
PLATE GLASS COMPANY**  
BRUSH DIVISION • BALTIMORE, MD.



**VICE PRESIDENT AT 25:** Charles A. Simmons, Jr. (above), at 25 has been elected vice president and general manager of the Simmons Machine Tool Corp., Albany, N. Y. Charles A. Simmons, Sr., president of the company, is a member of the Tools Section of OPM.

## Lincoln Publishes 2nd Set Of Arc Welding Lessons

Cleveland

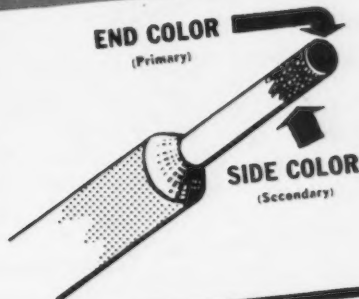
••• The second edition of "Lessons in Arc Welding" is now available from the Lincoln Electric Co. It provides to industry, to engineering colleges and vocational schools the accumulated welding instruction information from the Lincoln Welding School, which has been in operation for 24 years. Helpful to beginners learning to arc weld, also to experienced welders and to supervisors, the book comprises a ready reference on arc welding and a guide to its proper application.

There are 60 lessons in the book, which contains 176 6 x 9-in. pages and 170 illustrations, bound in flexible covers. The book is written around the use of Lincoln welding generators and specific classes of welding rod, but covers the general principles of arc welding all classes of metals. Price is 50c. per copy postpaid in the United States, 75c. elsewhere.



# ARCOS ELECTRODE STUB END IDENTIFICATION COLOR CHART

For Arcos Electrodes manufactured after  
June 1, 1941



GRADE	TYPE No.	END COLOR (Primary)	SIDE COLOR (Secondary)
Chromend 16/7	301X	Yellow	Black
Chromend K	306	Yellow	Blue
Chromend 19/9 Cb	347	Yellow	White
Chromend K-Mo	316	Yellow	Green
Chromend K-Mo-Cb	316 + Cb	Yellow	Brown
Chromend 18/8 Mo	317	Yellow	Red
Chromend KS	302 + B	Yellow	
Stainlend K	306	Black	Blue
Chromend HC	309	Black	
Chromend 25/12 Cb	309 + Cb	Black	
Stainlend HC	309	Red	Blue
Chromend HCN	310	Red	White
Chromend 25/20 Cb	310 + Cb	Red	Light Green
Chromend 25/20 Mo	310 + Mo	Green	Brown
Chromend HN	311	Green	Yellow
Chromend 8/18	325	Green	Red
Chromend 25/3 Mo	329	Green	
Chromend 29/9	312	Green	Blue
Chromend 15/35	330	Green	White
Chromend 13/60		Green	White
Chromend 15/85		Light Green	
Chromend 20/80		Purple	
Nickelend		Grey	Blue
Chromend 2M	502	Grey	Brown
Chromend 5M	410	Grey	Green
Chromend 12	430	Grey	Red
Chromend 16	442	Grey	Yellow
Chromend 18	446	Grey	Blue
Chromend 28		Orange	
Mixend		Orange	Red
Reformend		None	
Manganend 13		None	
Bronzend E		None	
Bronzend P		None	
Carend		None	

In accordance with  
recently adopted  
N.E.M.A. Standards.

A copy of this  
chart may be ob-  
tained from Arcos  
Corporation or any  
of their distribu-  
tors listed below.

The color designations listed above are in  
accordance with the recently adopted  
N.E.M.A. Standards

**ARCOS CORPORATION**  
401 NORTH BROAD ST., PHILADELPHIA, PA.

SM-6411

## Distributors Warehouse Stocks in the Following Cities:

ATLANTA, GA. . . . . J. M. Tull Metal & Supply Co.  
BUFFALO, N. Y. . . . . Root, Neal & Co.  
BORGER, TEXAS . . . . . Hart Industrial Supply Co.  
BOSTON, MASS. Belmont H. Boker & Co., Inc.; W. E. Fluke  
CHICAGO, ILL. . . . . Machinery & Welder Corp.  
CINCINNATI, OHIO . . . . . Williams & Co., Inc.  
CLEVELAND, OHIO . . . . . Williams & Co., Inc.  
COLUMBUS, OHIO . . . . . Williams & Co., Inc.  
DETROIT, MICHIGAN . . . . . C. E. Phillips & Co., Inc.  
ERIE, PENNA. . . . . Boyd Welding Co.  
FT. WAYNE, IND. . . . . Wayne Welding Supply Co., Inc.  
HONOLULU, HAWAII . . . . . Hawaiian Gas Products, Ltd.  
HOUSTON, TEXAS . . . . . Champion Riset Co. of Texas  
KANSAS CITY, MO. . . . . Welders Supply & Repair Co.  
KINGSFORD, TENN. . . . . Slip-Not Belting Corp.  
LOS ANGELES, CALIF. . . . . Ducommun Metals & Supply Co.  
MILWAUKEE, WIS. . . . . Machinery & Welder Corp.  
MOLINE, ILL. . . . . Machinery & Welder Corp.  
NEW YORK, N. Y. . . . . H. Boker & Co., Inc.  
OKLAHOMA CITY, OKLA. . . . . Hart Industrial Supply Co.  
PAMPA, TEXAS . . . . . Hart Industrial Supply Co.  
PITTSBURGH, PA. . . . . Williams & Co., Inc.  
PORTLAND, OREGON . . . . . Industrial Specialties Co.  
ROCHESTER, N. Y. . . . . Welding Supply Co.  
SAN FRANCISCO, CALIF. . . . . Ducommun Metals & Supply Co.  
SEATTLE, WASH. . . . . H. A. Cheever Co.  
ST. LOUIS, MO. . . . . Machinery & Welder Corp.  
SYRACUSE, N. Y. . . . . Welding Supply Co.  
TOLEDO, OHIO . . . . . Williams & Co., Inc.



"QUALITY WELD METAL EASILY DEPOSITED"

THE IRON AGE, July 10, 1941—95

## Government Approves Trade Shows, Exhibit Managers Hear

Cleveland

••• The value of technical and trade shows during the present national emergency is fully appreciated by government officials and business executives, stated P. C. McMurrer, assistant to the secretary of the American Mining Con-

gress, who spoke before a two-day convention of the Association of Exhibit Managers here June 27. His conclusion came from a survey of 50 major trade show groups.

Of the shows held since the start of the national defense program, 13 months ago, Mr. McMurrer said most had shown an increase in amount of exhibit space contracted for and an increase in attendance,

as well as a strong desire on the part of the government to cooperate.

Other speakers during the two-day session were C. E. Hoyt, executive vice-president of the American Foundrymen's Association and Charles M. Upham, of the American Road Builders Association. For the twelfth time William H. Eisenman, secretary, American Society for Metals, was reelected president of the Exhibit Managers Association. New directors include Miss Louise Wynne, Washington, of the American Road Builders Association and Ford Lamb, Detroit, secretary of the American Society of Tool Engineers.

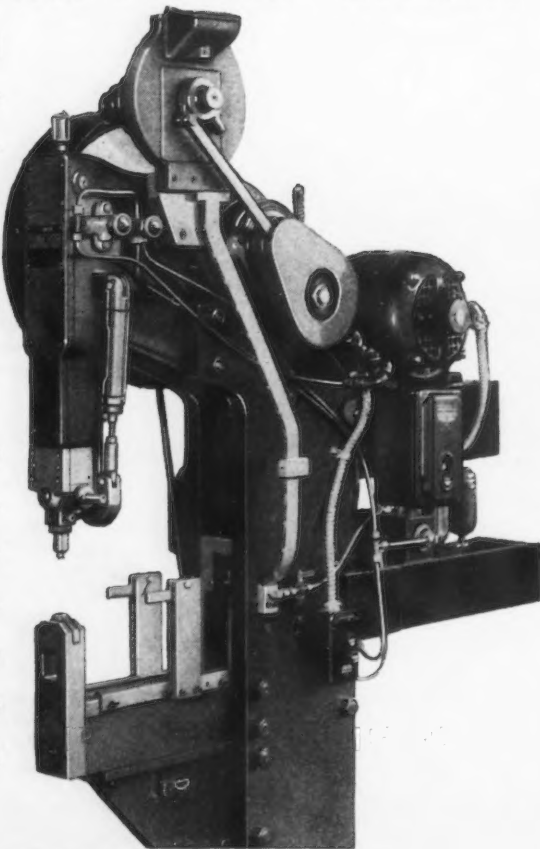
*p i e r c e s  
a n d  
r i v e t s*

## AUTOMATIC FEED "RIVET-PIERCE" RIVITOR

(the new "RK" machine)

The previously unpierced work is driven down over the underfed rivet—punching a slug out of the work. The rivet is then set at the next stroke of the machine.

Handles rivets of sizes up to .140 dia. x 1/4" long. These may be of any flat head type such as "coopers" or "tinnings". The size mentioned above can be set in total maximum work thickness of .075.



write for particulars to  
**THE TOMKINS - JOHNSON COMPANY**  
628 North Mechanic St., Jackson, Michigan

*this is a* **TOMKINS-JOHNSON** *product*

**PLANT PROTECTOR:** Defense plants in many U. S. industrial districts may some day be protected by barrage balloons. The balloon shown, designed to keep enemy bombers at a height that spoils their accuracy, was pictured during the first trial of barrage balloons held recently at Camp Davis, N. C.

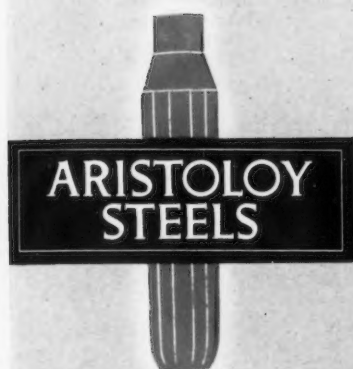
*Photo by International*





# *“Special Quality”*

**TOOL AND ELECTRIC FURNACE ALLOY STEELS**



**CARBON TOOL STEELS**

**ALLOY TOOL STEELS**

**VALVE STEELS**

**SPECIAL AND FINE STEELS**

**STAINLESS STEELS**

**FREE CUTTING STAINLESS STEELS**

**NITRALLOY STEELS**

**ARISTOLOY TOOL, SPECIAL, AND STAINLESS STEELS**

Hot Rolled • Pressed • Tempered • Annealed • Spheroidized Annealed  
Heat Treated • Cold Drawn • Straightened • Turned • Centerless ground

**COPPERWELD STEEL COMPANY WARREN, OHIO**

## **ARISTOLOY STEELS**

SPECIAL AND FINE STEELS, AIRCRAFT QUALITY STEELS, NITRALLOY STEELS, BEARING QUALITY STEELS, CORROSION AND HEAT RESISTING STEELS, CARBON TOOL STEELS, ALLOY TOOL STEELS, VALVE STEELS, STAINLESS STEELS, FREE CUTTING STAINLESS STEELS

## GOVERNMENT AWARDS

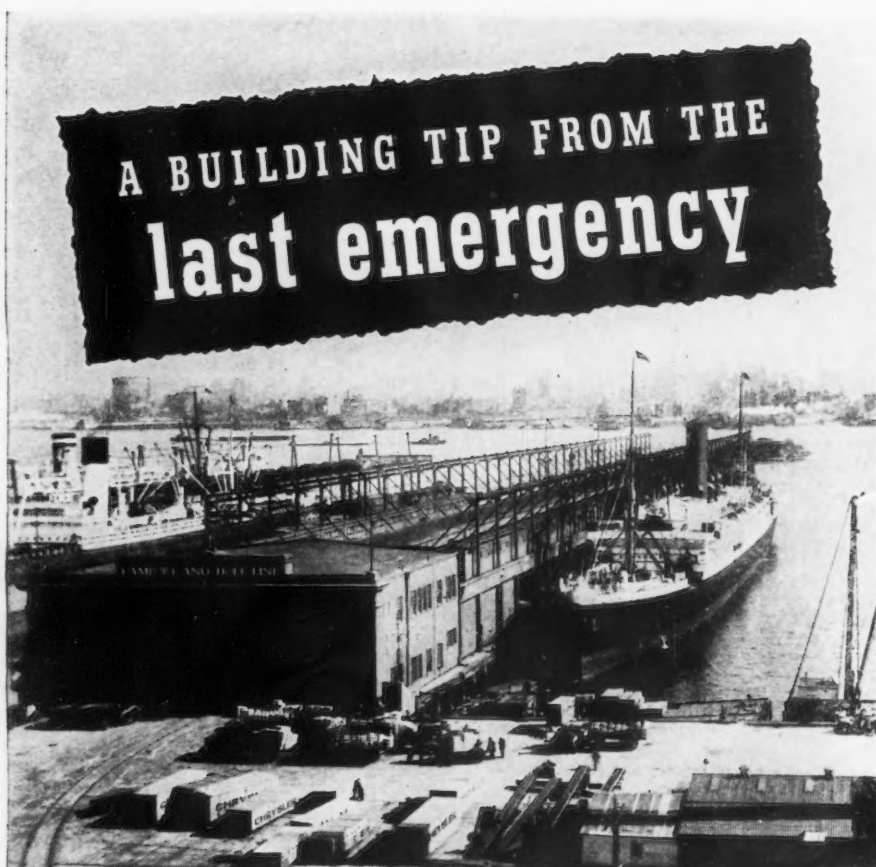
### Government Awards . . .

#### War Dept., Ordnance:

Affiliated Machine & Tool Co., New York; gages .....	\$4,704	American Locomotive Co., Dunkirk, N. Y.; gun carriages .....	2,138,000
All-Tool Co., Hillside, N. J.; punches, guides, plugs, sleeves and pins .....	1,896	spare parts, tank .....	1,982,995
American Broach & Machine Co., Ann Arbor, Mich.; machine, rotary, broaching .....	8,371	American Type Founders Sales Corp., New York; presses, job..	1,285
American Car & Foundry Co., Berwick, Pa.; parts for tanks .....	8,453	Ampco Metal, Inc., Milwaukee; seamless brass tubing .....	2,565
American Fork & Hoe Co., Cleveland; mattocks, commercial .....	2,264	Animal Trap Co. of America, Inc., Lititz, Pa.; plugs, fuze hole, for adapters .....	3,360
		Automatic Machine Products Co., Attleboro, Mass.; primers .....	71,700
		Aviation Mfg. Corp., Spencer Heater Division, Williamsport, Pa.; ammunition parts .....	33,000

### 1st Pack Howitzer Unit Is Completed

• • • Hannifin Mfg. Co., Chicago, has completed the first unit recoil mechanism for 75-mm. pack howitzers under an Ordnance Department contract, the War Department announces. In recognition of the event, 300 employees of the company assembled at the plant July 2, to hear the reading of a congratulatory message from Maj. Gen. C. M. Wesson, Chief of the Army Ordnance Department.



Many structures built of cheap materials in the 1917 emergency have proved dubious long-term investments. Yet the galvanized ARMCO Ingot Iron siding installed in 1917 on Pier 14 at Hoboken, N. J., is in good condition today.

Other installations that go back as far as 1909 give this metal the longest service record of any low-cost iron or steel sheets. And ARMCO Ingot Iron on the average costs *less than a cent a pound* more than ordinary galvanized steel.

Owners of ARMCO Ingot Iron buildings know this durable metal saves costly repairs and replacements. But that is not all. This corrugated metal is suited to fast, easy erection. It assures utmost protec-

tion against fire and lightning. And buildings made of ARMCO Ingot Iron have a high salvage value.

Profit from the experience of others in the plants and warehouses you are building. Use extra-durable ARMCO Ingot Iron\* for long life and low maintenance cost. The American Rolling Mill Co., 2291 Curtis St., Middletown, Ohio.

*\*For immediate painting and long paint life specify galvanized ARMCO Ingot Iron PAINTGRIP.*



# ARMCO

## INGOT IRON

Baldwin Locomotive Works, Baldwin Southwark Division, Eddystone, Pa.; machines, fatigue testing .....	1,590
Leon J. Barrett Co., Worcester; machines, drying and oiling .....	2,840
Bendix Aviation Corp., Bendix Products Division, South Bend, Ind.; parts for tanks .....	10,346
Bendix Aviation Corp., Eclipse Aviation Division, Bendix, N. J.; cranks, starting .....	2,268
parts for tanks .....	20,484
Bennet Machine Co., Inc., Brooklyn; thread cleaning machines, fixtures and scoops .....	2,598
Bethlehem Steel Co., Bethlehem, Pa.; forgings, breech rings .....	26,375
E. W. Bliss Co., Brooklyn; valve assays, for hydraulic press .....	2,200
Bridgeport Thermostat Co., Inc., Bridgeport, Conn.; assays, arming wire .....	1,880
Brown & Sharpe Mfg. Co., Providence; blades for pinion turning machines .....	6,144
Buckeye Traction Ditcher Co., Findlay, Ohio; winches, single drum for tractors .....	27,048
Buda Co., Harvey, Ill.; engines and spare parts .....	554,232
Budd Wheel Co., Detroit; artillery ammunition .....	427,040
Bullard Co., Bridgeport, Conn.; lathes, turret, vertical, spiral drive and high speed .....	4,391,440
Byers Office Equipment Co., Davenport, Iowa; chairs, metal typist and clerical .....	1,387
Canister Co., Phillipsburg, N. J.; wrench parts and crimping machines .....	3,666
Carboloy Co., Inc., Detroit; reamers .....	2,279
Carpenter Steel Co., Reading, Pa.; steel .....	10,036
Chase Brass & Copper Co., Cleveland; brass .....	1,837
Chicago Flexible Shaft Co., Chicago; fuzes .....	327,684
E. D. Clapp Mfg. Co., Auburn, N. Y.; drop forgings .....	1,185
Cleveland Automatic Machine Co., Cleveland; machines, turret, single spindle, shaft .....	81,582
Cleveland Twist Drill Co., Cleveland; drills .....	3,483
Colt's Patent Firearms Mfg. Co., Hartford; small arms materiel ..	102,803
gun parts .....	9,750
Continental Motors Corp., Muskegon, Mich.; flanges, exhaust pipe parts for tanks .....	1,642
County Supply Co., Plainfield, N. J.; tools .....	14,973
Crucible Steel Co. of America, Pittsburgh, Pa.; steel .....	1,026
Cuno Engineering Corp., Chicago; filters .....	8,965
	1,680



**You Pay the Same for Power - - Delivered or Dissipated!**

**SPEED UP WORK . . .  
CUT COSTS WITH THE  
30,000  
HOUR LINE**



**H**IGH speeds . . . shock loads . . . heavy, medium and light duty . . . dust . . . water . . . heat . . . acid fumes . . . all of these and many more service conditions are provided for in the 30,000 hour line.

Most important to executives who want insurance against failures which mean costly production delays is the fact that each Dodge Rolling Bearing is designed for a life expectancy of 30,000 hours under conditions for which it is adapted.

Dodge Rolling Bearings provide a quick, sure and economical solution for many vital problems facing industry today. The com-

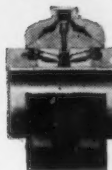
plete line of pillow blocks and unit mounts making up the 30,000 hour line makes it easy to modernize equipment and drives, thus stepping up production and eliminating troublesome and expensive maintenance problems.

Send for the NEW Dodge Selection Tables which have taken all of the guesswork and uncertainty out of bearing selection and make the task of picking the right bearing for any job as simple as A.B.C. If you do not have the Dodge Rolling Bearing catalogues include them in your request.

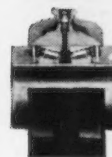
**DODGE MANUFACTURING CORPORATION**  
MISHAWAKA, INDIANA, U. S. A.



• Dodge-Timken Special Duty Pillow Blocks and Unit Mounts for heavy loads and high speeds.



• Dodge-Timken Clamp Sleeve Bearings . . . Hanger Bearings . . . Pillow Blocks and Unit Mounts. Rugged, and dependable general purpose bearings.

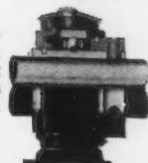


• Dodge-Timken Type "C" Bearings . . . Hanger Bearings, Pillow Blocks and Unit Mounts with special seals to exclude the finest abrasive dust.

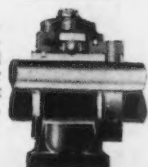
• Dodge-Timken "Double Interlock" Pillow Blocks and Unit Mounts for normal radial, thrust and shock loads.



• Dodge "DH" Ball Bearings — Hanger Bearings, Pillow Blocks and Unit Mounts. For high speeds and light to moderate loads.



• Dodge "DH" Iron-clad Ball Bearing Pillow Blocks with rugged cast iron housing for high speeds and light to moderate loads.

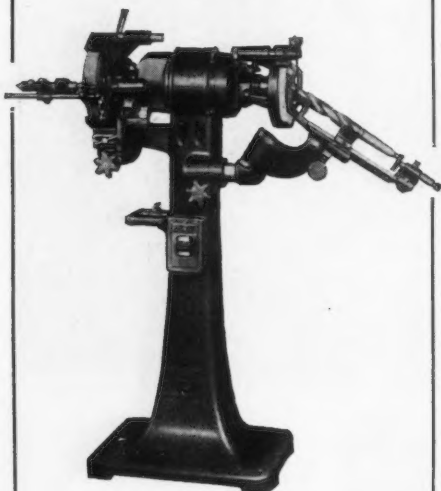


**THE RIGHT DRIVE**

**FOR EVERY JOB**

# Grand Rapids

## COMBINATION DRILL AND TAP GRINDERS



**MODEL 10-B  
SHARPENS TAPS, 2, 3  
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Hand. Sizes #6 to one  
and one half inches.**

**SHARPENS DRILLS, 2  
and 3 Flute, Straight or  
Taper Shank. Sizes from  
one eighth to one and one  
half inches.**

**"Sharp Drills and Taps Cut  
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Costs."**

**Other Combinations also  
Available.**

**Write for complete  
descriptive literature.**

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LIVINGSTON CO.**

**303 STRAIGHT AVE. S.W.  
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## GOVERNMENT AWARDS

Edgcomb Steel Co., Philadelphia; tool steel forgings .....	1,581	Johnson Tool & Engineering Co., Dayton, Ohio; pyrotechnic pistols .....	288,706
steel, tool .....	1,220	John P. Kelly, Philadelphia; cast- ings, aluminum bronze .....	12,209
John Evans' Sons, Inc., Philadel- phia; springs, firing pin .....	1,075	Landis Machine Co., Waynesboro, Pa.; taps, parts and chasers ..	12,285
Federal Tool Corp., Chicago; gages A. Finkl & Sons Co., Chicago; steel .....	6,130	Liberty Tool & Die Corp., Roches- ter, N. Y.; punches, head .....	3,000
Ford Motor Co., Dearborn, Mich.; spare parts for service trucks...	2,316	Lincoln Electric Co., Cleveland; welders, portable .....	2,025
E. C. Fuller Co., New York; presses, job .....	23,607	Lindley Electric Supply Co., Phila- delphia; wire .....	3,081
G.M. Co. Mfg. Co., Inc., Long Is- land City, N. Y.; supports for fuze plunger .....	7,531	Losco Lead Seal Co., New York; lead seals .....	1,590
General Cable Corp., St. Louis, Mo.; cable and reels .....	4,500	J. L. Lucas & Son, Inc., Bridge- port, Conn.; boxes, steel .....	2,200
General Motors Corp., Guide Lamp Division, Anderson, Ind.; car- tridge cases .....	6,183	Modern Tool & Die Co., Philadel- phia; gages .....	14,175
General Motors Corp., Harrison Radiator Division, Lockport, N. Y.; coolers .....	1,206,960	Morton Mfg. Co., Chicago; chests, ammunition .....	836,160
Goddard & Goddard Co., Inc., Det- roit; cutters and blades, cutters, milling .....	7,637	Motor Wheel Co., Lansing, Mich.; artillery ammunition .....	228,540
Greenfield Tap & Die Corp., Green- field; gages .....	3,367	Muncie Gear Works, Muncie, Ind.; gun carriages and spare parts..	807,300
Hampden Electric Supply Co., Springfield, Mass.; conduit, steel, galvanized .....	1,357	Newburgh Wire Works, Cleveland; steel, manganese, molybdenum..	156,679
Handy Governor, Ann Arbor, Mich.; parts for tanks .....	1,408	Niles-Bement-Pond Co., Pratt & Whitney Division, West Hartford, Conn.; gages .....	8,467
Hannifin Mfg. Co., Chicago; recoil mechanisms .....	9,168	Noble & Westbrook Mfg. Co., Hartford; machines, marking ..	1,960
High Standard Mfg. Co., Inc., New Haven, Conn.; small arms mate- riel .....	570,000	Norris Stamping & Mfg. Co., Los Angeles; cartridge cases .....	69,297
Hydraulic Controls, Inc., Chicago; pumps .....	4,870,817	Onsrud Machine Works, Inc., Chi- cago; machinery, with complete equipment .....	64,106
Hydril Co. of Pennsylvania, Roches- ter, Pa.; artillery ammunition..	4,650	Otis Elevator Co., Buffalo; gym- nasticating machines, timing de- vices and pressure pump .....	6,855
Independent Pneumatic Tool Co., Chicago; hoists, air motor .....	420,700	castings, steel .....	6,388
International Business Machines Corp., International Time Record- ing Division, Springfield, Mass.; parts for accounting machines..	5,248	Pennsylvania Forge Corp., Phila- delphia; forgings, alloy steel ...	15,996
International Harvester Co., Chi- cago; tractor parts .....	3,220	Perfex Corp., Milwaukee; fuzes...	350,000
Johnson Brass Co., Roxbury, Mass.; castings, bronze, aluminum .....	11,450	H. K. Porter Co., Inc., Pittsburgh; artillery ammunition .....	440,940
	38,905	Precision Mfg. Co., Philadelphia; gages .....	24,349
		Porter Forge & Furnace, Inc., Ever- ett, Mass.; forgings, steel drop..	2,129
		Production Tool & Die Co., Spring- field, Mass.; gages .....	2,160

**AUTOSYN MOTORS:** Watch-like in size and precision, weighing scarcely 7 oz. and accurate to one ten thousandth of an inch, several hundred tin Autosyn motors, shown below, are being turned out daily for installation in defense aircraft by General Motors' Delco Appliance Division, Rochester, N. Y. In multiple installations of as many as 20-odd in one plane, these motors "tell" the pilot the exact position of the many moving parts of his ship.





Defense Requirements Demand  
the Use of **MOLYBDENUM**  
High-Speed Steels !

# LATROBE

# DOUBLE-SIX

## HIGH-SPEED TOOL STEEL

*... meets this demand with no  
sacrifice of tungsten efficiency!*



THE MARK OF  
BETTER TOOL STEELS

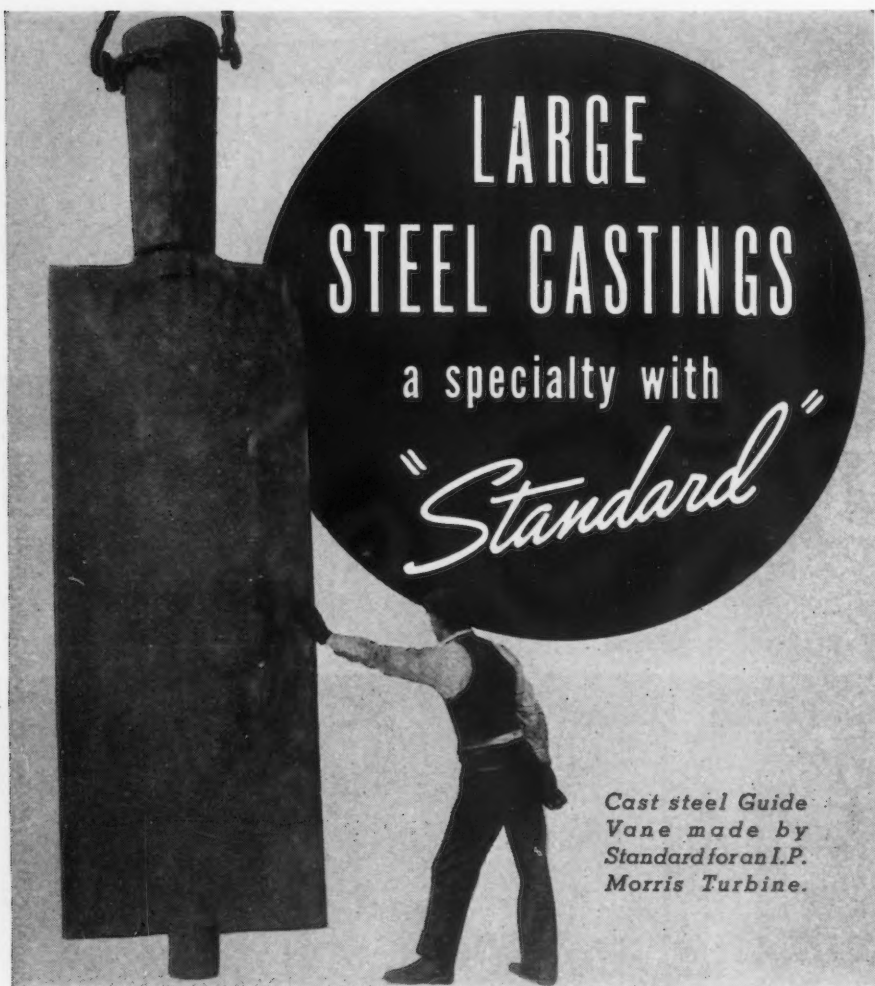
You will find DOUBLE SIX equal . . . and often superior . . . to higher tungsten types. Due to its low tungsten content, DOUBLE SIX High Speed Tool Steel is a valuable help in conserving tungsten for the needs of the defense program.

*Its tungsten-molybdenum content provides a proper balance for maximum cutting efficiency, with a minimum of decarburization plus superior heat-treating qualities.*

<sup>9</sup> *Latrobe*

## ELECTRIC STEEL COMPANY

MAIN OFFICES *and* PLANT • LATROBE • PENNSYLVANIA



**LARGE  
STEEL CASTINGS**  
a specialty with  
*"Standard"*

*Cast steel Guide Vane made by Standard for an I.P. Morris Turbine.*

**Standard** is equipped to supply steel castings of unusual size and shape to suit your requirements.

The acid open hearth steel is produced in **Standard's** furnaces under the control of trained metallurgists.


**Standard's** long experience and expert personnel is reflected in the high quality of its products.

CASTINGS • FORGINGS • WELDLESS RINGS • WROUGHT STEEL WHEELS

**STANDARD STEEL WORKS**

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BALDWIN DE LA VERGNE SALES CORP. • THE WHITCOMB LOCOMOTIVE COMPANY  
THE MIDVALE COMPANY • CRAMP BRASS AND IRON FOUNDRIES DIVISION



## GOVERNMENT

Pullman Standard Car Mfg. Co., Hammond, Ind.; gun carriages.	900,000
Quality Tool & Die Co., Indianapolis; gages	14,924
R. & M. Mfg. Co., Royal Oak, Mich.; gages	10,310
Reed & Prince Co., Worcester; screws, wood, steel	5,145
Republic Steel Corp., Buffalo; steel, bar stock forgings	1,712
Ric-Wil Co., Barberton, Ohio; supplies, plumbing	2,681
Rock Island Metal Foundry, Rock Island, Ill.; castings and projectile hoists	3,220
John A. Roebling's Sons Co., Philadelphia; galvanized wire	1,230
Sipp-Eastwood Corp., Paterson, N. J.; drills, holders and bits	2,377
Snap-On Tools Corp., Kenosha, Wis.; commercial extensions, handles, hinge	1,040 4,256
Somerville, Machine & Foundry Co., Somerville, Mass.; castings, bronze	1,317
castings, aluminum bronze	10,378
Square D Co., Kollsman Instrument Division, Elmhurst, N. Y.; compasses	7,200
Standard Pressed Steel Co., Jenkintown, Pa.; steel benches	4,950
Stanley Works, New Britain, Conn.; metallic belt lines	1,168,000
W. M. Steel Co., Worcester; machines, reaming	20,500
Syracuse Supply Co., Syracuse, N. Y.; head drill, spindle drill	1,002
Taft-Peirce Mfg. Co., Woonsocket, R. I.; equipment, tool room	1,220
Talon, Inc., Meadville, Pa.; gages	1,365
Titeflex Metal Hose Co., Newark; conduit, flexible shielded	11,581
Towmotor Co., Cleveland; trucks, lift and tractor	5,990
Timken Detroit Axle Co., Wisconsin Axle Division, Oshkosh, Wis.; parts for tanks	1,333
Tri-Metal Products Corp., Conshohocken, Pa.; castings, bronze	9,541
Tungsten Electric Co., Union City, N. J.; tools	30,680
J. C. Ulmer & Co., Cleveland; gages	1,008

**MINE PAINTERS:** Soldiers of Fort Indrinal mines to be planted and Fort's coast artillery school.





## AWARDS

Underwood Machinery Co., South Boston; pilot rammer, practice machine .....	53,750
Union Hardware Co., Torrington, Conn.; rods, rifle cleaning .....	1,950
Union Twist Drill Co., Athol, Mass.; drills .....	2,459
United Shoe Machinery Corp., Boston; guns .....	1,902,374
forgings, steel drop .....	4,692
Warner Electric Brake Mfg. Co., South Beloit, Ill.; gun parts....	1,553
Warner & Swasey Co., Chicago; chucks for turret lathes .....	1,059
Waterbury Clock Co., Waterbury, Conn.; assys. for flare fuze ....	3,960
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.; machines, assembly .....	31,016
Watson-Stillman Co., Roselle, N. J.; presses, hydraulic .....	1,300
Howard L. White, Brooklyn; head, rifling .....	2,950
J. H. Williams & Co., Buffalo; drop forgings .....	3,509

## War Dept., Air Corps:

Bell Aircraft Corp., Buffalo, N. Y.; airplanes and spare parts .....	\$15,885,081
Curtiss-Wright Corp., Airplane Div., Buffalo, N. Y.; airplane maintenance parts .....	7,809,597
Douglas Aircraft Co., Inc., Santa Monica, Cal.; airplanes and spare parts .....	7,843,010
General Motors Corp., Chevrolet Motor Div., Detroit; engines and spare parts .....	89,075,000
Lockheed Aircraft Corp., Burbank, Cal.; airplanes and spare parts .....	2,797,947
North American Aviation, Inc., Dallas, Tex.; airplanes and spare parts .....	57,725,572
Vultee Aircraft Inc., Downey, Cal.; airplanes and spare parts .....	31,619,280
Northrop Aircraft, Inc., Hawthorne, Cal.; airplanes and spare parts .....	16,287,134
Republic Aviation Corp., Farmingdale, L. I., N. Y.; airplanes and spare parts .....	7,843,010

Monroe, Va., are shown painting cylinders fired during a demonstration by the  
*Photo by Wide World*



**THEY MAKE PARTS LIKE THESE**  
—THOUSANDS OF THEM—ANY DESIGN, SIZE, SHAPE OR  
FORM YOU NEED—IN ANY MATERIAL—FOR ALL  
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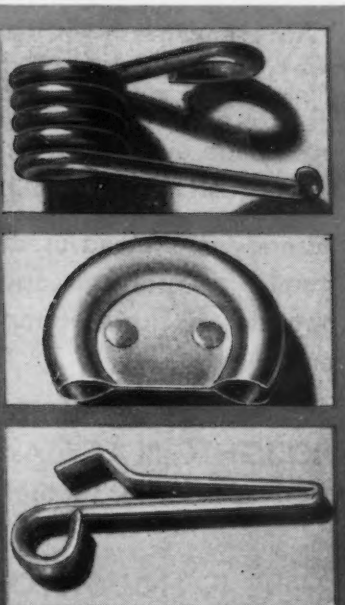
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WASHERS · COTTERS  
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# FOR BLACKENING STEEL PARTS

## HOUGHTO- BLACK

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- ECONOMICAL

HOUGHTO-BLACK is a balanced, uniform blackening solution which is used to give steel parts an even, lustrous black color, resisting oxidation and improving appearance. It is a single-bath treatment which shortens the time materially.

With the increasing necessity for (1) protecting iron and steel parts against oxidation, and (2) adapting low-carbon steels to uses where high alloy steels were formerly employed, but now given over to defense work—HOUGHTO-BLACK fills a real need in the metal industry.

Already it is being used as a finish for machine guns and small arms parts, because it is more rapid, uniform and operates at lower temperatures than processes formerly employed.

It will pay you to investigate HOUGHTO-BLACK. Ask the Houghton Man, or write for factual folder at right.



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Chicago • PHILADELPHIA • Detroit

# HOUGHTO-BLACK

### British Tank, Gun Output Rises 50% in 2nd Quarter

*London*

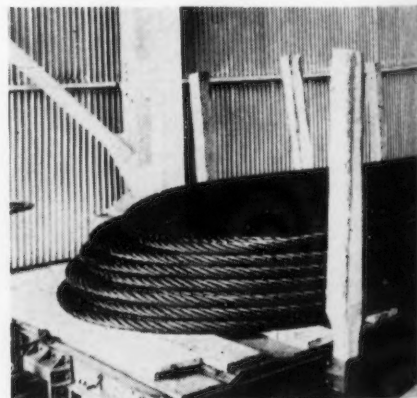
••• British production of tanks and guns in the second quarter of 1941 increased 50 per cent over the preceding quarter, Sir Andrew Duncan, Minister of Supply, has reported to the House of Commons. Sir Andrew, formerly with the Iron and Steel Federation, said that while this rate of increase cannot be maintained, a steady rise in output is expected. He has set no time for achieving maximum production, believing that expansion is unlimited—by new plants, additional labor and by getting more out of the machines, some of which are now being run at as much as 50 per cent above rated capacity.

### Federal Regulations Office Created by Acheson Colloids

*Detroit*

••• A department to handle all problems relating to taxes, priorities, patents, social security, publicity, advertising, administrative laws and national defense problems, has been created by Acheson Colloids Corp., Port Huron, Mich., Howard A. Acheson, president of the company, announces. John C. Sprague, secretary and a director of the company, will be in charge of the new department and will transfer his headquarters to Port Huron from New York, where he has been for the past seven years.

**45,000-lb. ROPE:** This 4000-ft. length Bethlehem Steel Co.'s Williams- in oval loops on a flat car instead Railroad of New Jersey, the rope, to haul loaded coal cars up the



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## Cone Worm Gears Now Called "Cone-Drives"

Detroit

••• The former Cone Worm Gear division of the Michigan Tool Co. is now known as the Cone-Drive division and the product has been similarly renamed. The designation of the term worm gearing in connection with the firm's double-enveloping type of gearing has been dropped to avoid confusion with conventional worm gearing, which is single enveloping. In the Cone-Drive, both driving and driven members envelop each other and give the set greater load carrying capacity.

## Walker Heads Cleveland Area Priorities Office

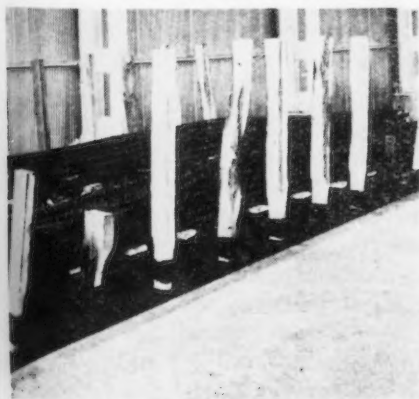
Cleveland

••• A local field office of the Priorities Division of the O.P.M. has been established here under W. Thomas Walker, who will handle problems of sub-contractors who do not have any army or navy priorities and of civilian production. The office is located in the Federal Reserve Bank Building.

Herman H. Lind, who has been serving as manager of the Defense Contract Service here, has been named deputy coordinator in this region. Mr. Lind's former position as manager will be filled by Charles R. Terry, sales manager of Hydro Power Systems, Inc., a division of Hydraulic Press Mfg. Co. R. H. Sankey has been appointed assistant to Mr. Terry.

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of 2 3/4-in wire rope, manufactured by port (Pa.) division, was shipped coiled of on a reel. Purchased by the Central of "formset" construction, will be used Ashley incline near Wilkes-Barre, Pa.



# A New IDEA...

**TO MAKE YOUR JOB EASIER!**

THIS NEW contribution to your convenience is a printed chart—showing the analysis requirements of 17 Army and Navy specifications for Carbon Steels. Compiled by Frasse Technical Service, it saves the time lost fishing through individual "specs"—enables you to identify the specified steel at a glance.

Chart shows Government specification numbers, and detailed chemical analysis of each class. Also lists specified forms (bars, wire, etc.) and the corresponding SAE number. It's printed on tough cardboard, regular file card size—can be filed, tacked on wall, or slipped under glass to keep it at your fingertips. It's free, of course—as is Frasse assistance on any problem involving mechanical steels.

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- STEEL PRIORITIES?** Let Frasse help on the details: Your preference rating, what forms to file, when required, where to file.
- BLOCKED DELIVERIES?** A more available substitute may save weeks for you. Let Frasse Technical Service help you find one.
- PRODUCTION "BUGS"?** Frasse engineers are experienced trouble-shooters. Their assistance is yours for the asking.
- MILL SHIPMENTS?** To cut detail work, let Frasse handle your mill orders. Service Department keeps you informed, handles all routine follow-up, etc. No time lost, no extra cost.
- SUBSTITUTES?** Complete data on unfamiliar grades furnished without obligation.

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1918-1941  
125<sup>th</sup>  
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# STANDARD S.A.E. ALLOY STEELS IN STOCK

For those who prefer standard numbered steels we have

2315	3140	X4130 (Aircraft)
4615	3145	X4340 (Aircraft)
4615 (Elec. Fur.)	X4340	2330 (Aircraft)
3130	6145	4140
3135	6150	4150

For those who wish to take advantage of constant metallurgical improvement and development long before they are incorporated in S.A.E. standards or where close selection of material for analysis, grain size, control and quality is desired, we offer

ALLOY



GRADES

THE HY-TEN OF TODAY IS THE STANDARD STEEL OF TOMORROW

"A" IX	"B" 2	"B" 4	"B" 43
"A" 15	"B" 3X	"B" 5	"M" Temper

Rounds  
Squares  
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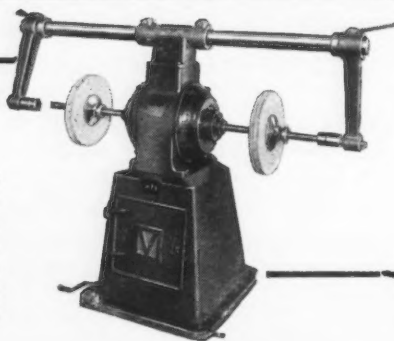
**WHEELLOCK, LOVEJOY & CO., INC.**

Send for Data Sheets

Warehouses  
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## What's NEW in BUFFERS?

With this adjustable - clearance Marschke Buffer, one airplane manufacturer saves precious time in finishing awkwardly contoured pieces. Elsewhere Marschke Swing Frame Buffers have replaced slow and light hand tools in polishing plane and ship propellers.



Ask about a Marschke for your special grinding or finishing operations. Or write for Catalog of standard pedestal, floor stand and swing frame Marschkes, 1 to 25 HP. 10" to 30" wheels.

MARSCHKE heavy duty Buffers and Grinders are adaptable to scores of special uses. But whether special or standard machines they give you Marschke's 18 points of superiority. Correct wheel speeds, operating conveniences and machine tool construction standards assure steady, faster production. Triple-seal bearings with internal grease reservoirs are among the "tremendous trifles" that assure minimum maintenance during long dependable life. Marschkes are worth knowing about. We'd like to tell you.

VONNEGUT MOULDER CORP., 1843 Madison Ave., Indianapolis, Ind.

## U. S. Faces "Ersatz" Period In Metals, OPM Official Says

Washington

... Pointing out that "this is a war of metallurgy," Robert E. McConnell, OPM chief of conservation and substitution, declared last week that metals of all kinds are needed in quantities unheard of before. People of the United States were warned that they "might as well face the fact that this defense program is going to mean that they will have fewer of the luxuries, comforts and conveniences to which they have become accustomed." Production of consumer goods, he said, is bound to be curtailed to an increasing extent. He urged conservation, noted that scrap aluminum will be collected between July 21 and 29 and said that the country can expect other campaigns for the collection of scrap metals.

While we are devoting about 17 per cent of our national income to defense work, Germany at present is devoting over 50 per cent of her national income and Britain between 40 and 50 per cent, Mr. McConnell stated. The percentage of our national income going into defense, it was said, will increase greatly within the next year or so—how much nobody knows at the present time except that the figure is constantly being revised upward.

"From these facts we can make the general deduction that there are not going to be enough metals—and that includes practically all metals—to serve both the defense program and a vastly expanded output of consumer goods," Mr. McConnell declared.

"Faced with this situation there are a number of solutions which will go part-way to meet the deficiencies.

"First, there is conservation. Secondly, there is substitution. Right now we are at the beginning of an ersatz program of our own. Third, there is the possibility of simplification of design. Some materials can be saved this way and a considerable amount of manufacturing facilities and manpower freed for defense work."



### Brazilian Mill Parts Will Be Bought Soon

Cleveland

• • • Purchasing of equipment will start soon for the \$35,000.-000 steel plant which will be built in Brazil with United States assistance, stockholders of Arthur G. McKee & Co. are told in a letter from R. E. Baker, secretary, accompanying the third dividend payment this year on the Class B stock.

Several large Canadian steel works contracts have come through recently, said Mr. Baker. Domestic inquiries are very large, equal to any period in the company's history. The dividend of 25c. regular, and 50c. extra, a total of 75c. per share, is payable to stock of record June 20.

### Construction Awards At All-Time High in June

• • • With the second phase of the defense construction program rapidly entering the contract stage, June construction awards topped all existing records. The month's volume of \$589,221,000, or a weekly average of \$147,305,000, exceeds the previous high average for the five weeks of October, 1940, by 5 per cent. June awards are 44 per cent above the weekly average of a month ago, and 133 per cent higher than a year ago as reported by *Engineering News-Record*.

The highest volume of public awards in history is primarily responsible for the new construction peak. The public total, on the weekly average basis, is 30 per cent greater than the former mark set last October, 73 per cent over last month, and 206 per cent higher than last year. Private awards in June declined to \$97,259,000 from \$125,280,000 in May.

### Building Costs Up 10%

Cleveland

• • • Factory building costs increased approximately 10 per cent during the second quarter of 1941, according to the quarterly index compiled by Austin Co. here. George A. Bryant, president, said there are now many special factors in almost every building project, such as premiums for early delivery, overtime pay, etc.

## DISC-TYPE VALVE DESIGN for better control of air power

• Positive, accurate control of arbor presses, riveters, air cylinders—any type of air operated equipment—helps keep production up. Hannifin disc-type design has the bronze disc ground and lapped to make a perfect seal with the seat. There is no packing, and no leakage or packing maintenance troubles.

Hannifin Air Control Valves are made in 3-way and 4-way types, hand and foot operated, manifold, spring return, heavy duty rotary, electric and special models. Write for Valve Bulletin 34-A.



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## HANNIFIN "Packless" VALVES AIR CONTROL

*the practical side of Springmaking*—BY DUNBAR

### SPRINGS on the Square



When springs are coiled from square wire the material becomes keystone shape. The keystoneing is more pronounced as the diameter of the spring lessens. This effect must be considered when figuring the solid height of springs made from square wire.

For figuring this keystoneing effect we suggest the following formula:

$$d^1 = .48d \left( \frac{OD}{PD} + 1 \right)$$

d = Original wire size.

d<sup>1</sup> = Width of wire after coiling.

OD = Outside diameter of spring.

PD = Mean diameter of spring.

For best results anticipate the obstacles to good design before the springs are made.

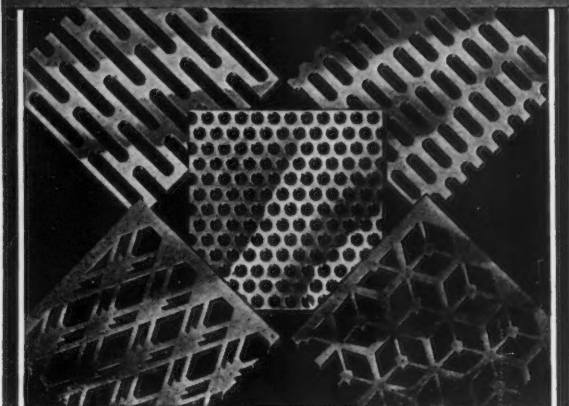
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"Quality Springs since 1845"

## PERFORATED METALS



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• • Results are what count, and the performance record of this wire rope continues to make and hold friends.

4. Furnished in both the Round and Flattened Strand constructions, in either Standard or Preformed Type.

There is no guess work when you use "HERCULES" (Red-Strand) Wire Rope. It is designed and built to do specific jobs better . . . safer . . . more economically. If you will tell us how you use wire rope, we shall be glad to suggest the construction and type most suitable for your conditions.

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## Iron Ore Study To Be Made on Coast By Mines Bureau

Washington

• • • The Senate last week passed and sent to conference the second deficiency appropriations bill containing a \$350,000 item for a Bureau of Mines exploration of iron ores, limestone and coking coals essential to the projected steel expansion on the Pacific Coast. Senator Joseph C. O'Mahoney, chairman of the now defunct TNEC (anti-monopoly) committee, used the occasion to attack "monopolistic practices" as retarding industrial growth in the West, alleging the old "Pittsburgh plus" plan was designed to concentrate iron and steel production in Pittsburgh.

The amendment calling for a Bureau of Mines exploration was sponsored by Senator Abe Murdock, Democrat of Utah, after he had talked repeatedly on the subject of West Coast steel expansion with W. A. Hauck, OPM consultant on steel, and S. R. Fuller, Jr., chief of OPM's materials branch. The latter, Mr. Murdock told the Senate, wrote a personal letter to President Roosevelt in which he requested that OPM be furnished with information on iron and coal deposits in California and other Pacific Coast states.

The Utah Senator referred to an article published in THE IRON AGE in March, 1940, which he said pointed to the deficiency of steel production in the West, then asked his colleagues:

"How can this nation, how can OPM intelligently provide for a \$100,000,000 steel expansion on the Pacific Coast without first deciding where the iron ore deposits are, what their character and quality are, and whether they are suitable for such an expansion?"

Figures submitted to the Senate by the member from Utah showed that seven Pacific Coast states normally consumed 2,276,000 tons of steel and produce about 600,000 tons, leaving a deficit of 1,676,000 tons. Mr. Murdock quoted an unidentified shipbuilding contractor in the West as saying it was impossible to get any orders for steel through until next December, and for one company, not until next January.



The \$350,000 appropriation in the Senate-approved bill provides:

"For all expenses to enable the Bureau of Mines to investigate by sub-surface exploration, the amount and quality of certain iron ores, limestone and coking coals essential to expanding steel production in the States of California, Colorado, Utah, Wyoming and all other states in which such deposits may exist."

Senator O'Mahoney charged that the development of "known deposits" of iron ore in his own state of Wyoming had been held back because the Colorado Fuel & Iron Co. has been "under the same type of suppression under which other enterprises in the West have been." Earlier in the debate, the TNEC chairman charged that the United States Steel Corp. had not contemplated its projected plant at Provo, Utah, until an independent steel enterprise on the Pacific Coast was under consideration in Washington. He identified the "independent enterprise" as one proposed by Henry J. Kaiser, West Coast contractor of many government projects, and told the Senate that Mr. Kaiser made overtures to Washington only after he faced a shortage of steel plates for his ship-building operations.

The Senator did not oppose the proposed Bureau of Mines exploration but offered the explanation that it is "monopolistic practice and not lack of information which has been holding back West Coast industrial development." He added:

"The famous device of which we have heard, lo, these many years, the device by which freight rates have been handled, namely, the 'Pittsburgh plus' plan, was instituted for the express purpose, among others, of concentrating iron and steel in the area in and around Pittsburgh."

### Moltrup Steel Products Will Bargain With SWOC

Beaver Falls, Pa.

• • • Moltrup Steel Products Co. here has notified the NLRB that it is ready to comply with a board order to bargain with SWOC and to offer reinstatement with back pay to five employees involved in a controversy which took place in June, 1937.

### Canada's Iron Output 113,624 Tons In May

Toronto

• • • With nine out of a total of ten blast furnaces blowing, pig iron production in Canada during May made an all time monthly production record totaling 113,624 gross tons, which compares with 103,326 gross tons in April and 93,254 gross tons for May last year. The month's output consisted of 96,784 tons of basic iron, all but 148 tons of which was for the further use of producing companies; 9177 tons of foundry iron and 7663 tons of malleable iron, all of the two latter grades being made for sale.

For the five months ended with May, cumulative pig iron production totaled 513,238 gross tons of which

425,260 tons were for further use of producers and 87,978 tons for sale, and compares with total of 460,971 gross tons produced in the corresponding period of 1940 and 243,716 gross tons for the same period of 1939.

During May output of ferro-alloys totaled 15,117 gross tons against 16,161 tons for April and 10,272 gross tons for May, 1940. For the five months ending with May production of ferro-alloys amounted to 73,181 gross tons compared with 48,116 tons in the same period of 1940 and 20,889 tons in 1939.

Production of steel ingots and direct steel castings topped all previous monthly records in May totaling 206,110 gross tons, which compares with 200,680 gross tons for April and 174,417 gross tons for May, 1940. The month's total included 197,114 tons of steel ingots

**TANK SIESTA:** A German soldier in North Africa makes himself comfortable in a hammock fastened to the caterpillar belt of his tank, according to information passed by the German censor.

*Photo by Wide World*

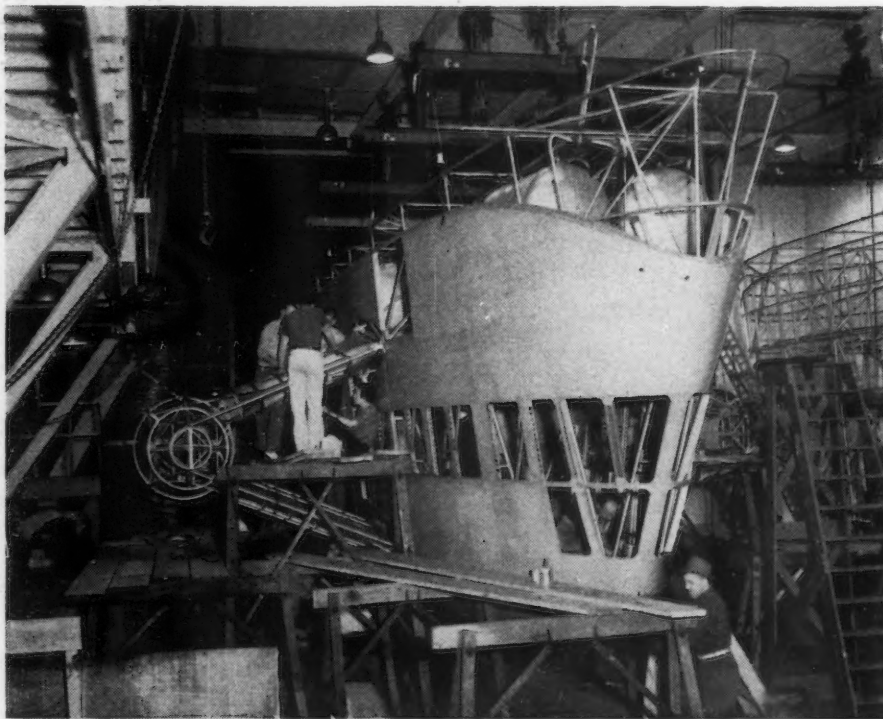


and 8996 tons of direct steel castings.

For the five months ended with May, production of steel ingots and direct steel castings reached the all time high record of 961,272 gross tons up from 792,033 tons for the corresponding period of 1940 and 472,239 tons in 1939. For the five months ended with May 31, 922,807 tons of steel ingots were produced and 38,465 tons of direct steel castings.

The nine blast furnaces blowing throughout May had production ratio of 92.8 per cent of Canada's total and were located as follows: Dominion Steel & Coal Corp., Ltd., Sydney, N. S., three; Steel Co. of Canada, Ltd., Hamilton, Ont., two; Canadian Furnace Co., Port Colborne, Ont., one, and Algoma Steel Corp., Ltd., Sault Ste. Marie, three. Algoma Steel has the only idle stack in Canada, one that has not been in operation for many years. The Steel Co. of Canada, Ltd., is completing installation of a 1000 tons blast furnace at Hamilton, which is expected to blow in within about six weeks and giving this company the largest pig iron producing capacity in the Dominion.

**BLIMP CONTROL CAR:** Nearing completion in the Goodyear Aircraft factory at Akron, Ohio, is this control car for one of the Navy's new non-rigid airships designed for coastal patrol service. In the background is the framework of another patrol car under construction. The completed ships will be 246 ft. long contain 400,000 cu. ft. of helium and be capable of cruising far off shore in search of mines, submarines, or any hostile surface craft.



110—THE IRON AGE, July 10, 1941

## Tool Engineers Meet In Toronto Oct. 16-18

••• To what extent older machine tools can be utilized to speed defense production is to be the major topic of discussion at the three-day semi-annual meeting, American Society of Tool Engineers, when that organization convenes at the Royal York Hotel in Toronto, Canada, Oct. 16 to 18.

The technical sessions on the opening day will be devoted to a general consideration of machine tools for defense work. A discussion of new modern machine tools versus used machine tools, and a further elaboration of the latter topic in terms of "Utilization of Old Machine Tools on National Defense Work," are scheduled to follow.

Since machine tools are useless without cutting tools to equip them, the second day's technical session will be devoted to "Getting the Most out of Cutting Tools." The third factor involved in increasing machine production—the shortage of trained personnel—will take up the third day's technical

session. This subject has for some months now been a major activity of the A.S.T.E. through its Emergency Defense Training Committee—which is endeavoring to help industry, governmental bodies, and educators to expedite and improve training of needed workers in practically every industrial community in the United States.

A feature of the three-day session will be extensive plant tours through major industrial concerns in the Toronto area now engaged in Canadian defense production.

In charge of the semi-annual meeting are a group of committees headed by general chairman Arnold Thompson, Toronto consulting engineer, and a director of the society. The committee in charge of technical sessions is headed by N. Wearn, assistant superintendent, Canadian Acme Screw & Gear, Ltd., and R. Sherk, chairman of the educational committee of the Toronto A.S.T.E. chapter. E. Barker, chairman of the Toronto Chapter and president, Modern Tool Works, is in charge of the committee arranging for plant inspection tours, while the transportation committee is headed by A. B. Lawrason, Dominion Wheel & Foundries, Ltd.

J. R. Bruce, purchasing agent of John Inglis Co., Ltd., and L. Singer, district manager of Williams & Wilson, Ltd., are in charge of accommodations, while entertainment is under the direction of F. Shytte, Canada Illinois Tools Co., Ltd., and H. Thorne, manager, Modern Tool Works.

## Weirton Deals With New Independent Union

••• Following certification by the checking of payrolls against claimed membership, Weirton Steel Co. officials started negotiations early this week with the new independent steel union known as the Weirton Steel Union. The NLRB recently ordered Weirton Steel to disestablish the Employees Representation Plan and the Weirton Steel Employee League. These two organizations have been dissolved by their members. The new independent union claims a majority of employees and has submitted such evidence to the Weirton Steel Co., it is said.



## Builders of Machine Tools May Pass on Preference Ratings

Washington

••• Subcontractors of machine tool builders are authorized under a revised OPM order to extend preference ratings on steel and other material to their own suppliers. Previously the order did not permit subcontractors to extend preference ratings automatically. Another change in the order is the provision for various ratings—A-1-a, A-1-b or A-1-c to various companies. The old order provided only one rating, a-1-a, which was applicable to all the machine tool builders covered. The reason given for the provision of varying ratings in the new order, announced by Priority Director E. R. Stettinius, Jr., is of the necessity of giving each company a rating which is appropriate for the urgency of the work on which it is engaged. It is also provided in the new order that the machine tool builder using a limited blanket rating can extend it only to obtain equipment going into certain specified machines.

The revised order, which takes the place of the previous machine tool order (P-2) issued on March 26, extends limited blanket preferences to approximately 450 builders of machine tools and similar working equipment and it was stated that the new order is designed to speed up production of machine tools.

Equipment to which the new ratings can be extended is specifically listed in the order as follows:

Motors and other electrical equipment; alloy steels in bars, forgings, castings and tubes; iron, steel, and aluminum castings; machine parts and equipment; cutting tools, including cemented carbides; abrasives; measuring instruments and gages; brass, copper, and steel tubing and fittings and oil resisting hose.

Foundry supplies consisting of: Steel rail and other steel scrap; silvery pig iron; regular pig iron; coke; ferro-silicon; ferro-manganese; vanadium; and nickel, molybdenum, and chromium.

In a summary of priority action which OPM has taken during the

first half of 1941, Mr. Stettinius points out that steel is in a special class. Iron and steel products are on the priorities critical list, subject to inventory control and also subject to General Steel Preference delivery order No. 1.

"The General Steel Preference delivery order is designed to assure the fulfillment of defense orders ahead of non-defense orders," Mr. Stettinius explained. "It provides that a customer for iron and steel products who is unable to place an order satisfactorily, or who has his order unduly delayed, may bring this to the attention of the Priorities Division on a special form. The Priorities Division will then require the supplier involved to explain delay or rejection."

Upon the basis of information thus obtained, the OPM will take whatever action is necessary to expedite the delivery of iron and steel products for defense or essential civilian purposes.

## Knudsen Forecasts Tripled Defense Load For Auto Producers

Washington

••• While two representatives of the American Iron and Steel Institute were discussing civilian allocation of steel with OPACS on Wednesday of last week, a shift of heavy steel tonnages from civilian to defense use was assured when OPM Director General William S. Knudsen informed 60 automobile manufacturers that they might be called upon to handle a defense load three times as heavy as its present orders, aggregating approximately \$2,000,000,000.

Coming to Washington to name a defense advisory committee to discuss further slashes in non-defense output, Mr. Knudsen told the auto-

### Farm Product Prices Gain 26.5%; Metals up 3.7%



••• Despite Government efforts to avoid price rises in the battle against inflation, prices of farm products have jumped 26.5 per cent in the past year while prices of metals and metal products have risen only 3.7 per cent, according to data on wholesale prices published by the U. S. Department of Labor. The gain in farm product prices was the highest of any of the commodity groups covered by the Department's report, while

the advance in the metal series was the lowest. Comparison of prices in other product groups reported by the Department of Labor for the weeks ending June 21, 1941, and June 22, 1940, show the following advances: Foods 19.4 per cent; hides and leather 8.6 per cent; textile products 17.5 per cent; building materials, 9.5 per cent, and chemicals and allied products 9.8 per cent.

mobile executives that their industry might as well "forget" the 20 per cent curtailment order of last April. He said that the increasing defense demands and the need of accumulating larger stockpiles of critical materials, such as steel, zinc, aluminum and chromium, of which the automobile industry is an outstanding consumer, made necessary further and greater cuts in motor vehicle production. The transition from automobile output to full defense production was forecast in THE IRON AGE of June 3.

Attending the OPACS meeting on allocation of civilian steel were C. H. H. Weikel, chairman of the Committee on Commercial Research of the American Iron and Steel Institute, and manager of commercial research for the Bethlehem Steel Corp.; and K. G. Fuller, committee member, and manager of market research, United States Steel Corp., of Delaware. They conferred with M. G. de Chazeau, head of OPACS iron and steel section, and his staff.

Up for discussion were reports which might be made by the industry and from which OPACS officials hope to estimate the amounts of steel available for civilian allocations. In the absence of definite information on steel requirements for the defense program, industry and OPACS representatives outlined a plan whereby orders on the books for the next two months will be analyzed in an effort to determine the proportion between defense and civilian demands. OPACS officials were understood to feel that, while the approach agreed upon was not the only possible method, it was thought to be the best available system at the moment.

Representatives of the committee are expected to be invited to attend subsequent meetings but no specific dates have been fixed for such conferences.

By reducing automobile production it is hoped to release materials for other civilian requirements, yet it is acknowledged that particularly in such lines as steel, shipments in growing volume will go to automotive plants for diversion to defense uses. It is understood that cuts in automobile production, yet to be formally determined, will be based on the amount of materials, if any, remaining after defense requirements are satisfied. This



**McKEESPORT PLANT MODERNIZED:** New sidewalls of brick, glass and steel were provided in modernization of the Firth-Sterling Co. plant at McKeesport, Pa. The plant produces high speed, tool and stainless steels.

would be in contrast with the former formula which was based on reduction of output. Tripling of defense orders for the automobile industry, it is estimated, would mean a drop in car production to between 2,000,000 and 3,000,000 units from some 5,000,000 units for the 1941 automobile year ending Aug. 1. Under the 20 per cent cut ordered in May for the year beginning next month, automobile production was to be cut by about 1,000,000 cars to approximately 4,200,000.

The advisory committee will consist of 19 members, 11 representing manufacturers of passenger cars, trucks, buses, taxis and fire vehicles, and eight representing makers of parts and components. The committee will be composed of one representative each from Ford, Chrysler and General Motors; four from six smaller manufacturers; four for 25 bus, truck, taxi and fire fighting equipment manufacturers and eight from makers of auto parts and components.

One of the duties of the Advisory Committee will be to discuss with OPM the amount of the further slash and the means of making it without creating unemployment and "wasteful shutdowns."

The OPACS meeting on civilian steel allocation is being followed by a series of meetings that the organization is to hold with representatives of durable goods industries to apportion steel and other critical materials among such in-

dustries, including those making refrigerators, washing machines, oil burners, steel furniture and similar consumer goods.

"It will be the policy of the Civilian Supply Allocation Division, once the amounts of scarce materials available for civilian use are ascertained, to allocate sufficient amounts if possible to take care of all essential public services such as transportation, power and health," said Leon Henderson, OPACS Administrator. "These uses would include such industries as railroads, electric power, water supply, gas, oil pipelines and such other essential needs as food, clothing, and health and safety requirements generally. Action is now being taken for the allocation of materials so far as possible for manufacture of repair parts for public utilities, trucks, automobiles, agricultural machinery and other necessary equipment. Scarce materials will be allocated among other civilian industries in order of need after consideration of such matters as dislocation of labor and effects on manufacturing efficiency."

#### Meigs, OPM Aircraft Chief, to Visit U. K. Plants

••• Merrill C. Meigs, chief of the aircraft section of OPM, will leave shortly for England to visit aircraft plants and confer with British aircraft production officials. Mr. Meigs' purpose is to exchange ideas and arrange for better coordination of aircraft output.



## British Troubled By Scrap Situation

London

••• The deficiency in iron ore imports in Britain has been largely made good by an expansion in the use of home-produced ore, output of which has risen by more than 50 per cent over the pre-war level of 12,000,000 to 14,000,000 tons a year.

For many months increasing attention has been paid in Britain to the collection and rapid handling of home iron and steel scrap supplies. The Ministry of Supply has carried out extensive circularization in rural areas for the collection of disused farm machinery and other local scrap, while municipal authorities have been constantly urged to collect the greatest possible quantity of scrap.

Nevertheless, it has needed hard work and constant vigilance by the scrap trade here to maintain deliveries at a satisfactory rate. There is at the present time an insistent demand, particularly for heavy steel scrap, and surprise has been expressed in some directions at the apparent complacency felt by the government over the scrap situation.

Criticism has been heard that collections of scrap, particularly in

rural areas (accumulated under the so-called "village dump" scheme) have not been collected and delivered to steel works.

George Wood, government director of steel supplies, has pointed out, that in immense operations as the war-time production of iron and steel, long views must be taken, and it should not be assumed that the situation was not fully in hand because collected stocks were in evidence at various points up and down the country. He confessed, however, that consumers were not getting as much scrap as they would like, but said that here also a long view must be taken.

There are certainly no grounds for undue complacency over the scrap situation here. Even if in the opinion of the government, supplies are fully adequate and the situation well in hand, it is obvious that the steel works would feel happier if they had substantially larger supplies in their own yards or available for immediate delivery. If this were not so the insistent demand which has been a feature of the market for many weeks past and which has imposed heavy burdens on the dealers in the matter of collection and very hurried delivery would hardly have arisen, and still less continued.

The probability is that under government war-time planning the

existence of reserve stocks at consuming works is not regarded as important or even necessary. Some sections of trade opinion, however, take a different view. They have not the knowledge possessed by the Government of the total stocks in the country, and still less have they any knowledge of the quantities likely to arrive from abroad.

The word "arrived" is used advisedly. Atlantic sinkings are still taking a heavy toll on shipping and scrap iron and steel sinks as easily as other commodities. It is arrivals and not purchases which are the significant figure. Internal delivery delays can and do occur occasionally despite the most careful planning. A notable instance was the rail hold-up in the North in the early months of this year due to heavy snowstorms.

While it may be that there is enough scrap available for the current requirements of the iron and steel industry, allowing for some substantial imports from America, it is obvious that the maintenance of scrap supplies is a problem which will demand unremitting care and vigilance not only on the part of the scrap industry itself, but also on the part of the government.

## Electro Metallurgical Makes Calcium Metal in Michigan

New York

••• Calcium Metal (metallic calcium), formerly imported in its entirety from France, is now being manufactured in commercial quantities by the Electro Metallurgical Co., New York, at its plant at Sault Ste. Marie, Mich.

The capacity of the plant is more than sufficient for present American consumption, and a manufacturing process has been developed which makes it possible to sell the product at prices which are comparable to those of the imported metal.

Although the uses of metallic calcium are numerous, it is mainly employed at present as an alloying agent for magnesium and is used in magnesium castings. Some steel manufacturers are using it in steel that must meet certain magnaflux specifications, and as a deoxidizing agent for steels high in nickel and chromium.

6-WHEEL ARMY TRUCKS: A new assembly line is being put in the Studebaker plant at South Bend, Ind., for the manufacture of nearly \$16 million of these special 6-wheel cargo trucks for the U. S. Army. (Studebaker has been building Army truck for foreign governments for two years.)



## General Steel Preference Delivery Order is Revised

Washington

••• Because the forms prescribed for customers and producers under the general steel preference delivery order of May 29 have not been "entirely appropriate" for the purposes intended to be fulfilled, the OPM's priorities division has issued two revised forms, requiring more detailed information.

Designed to facilitate the delivery of iron and steel products to defense and essential civilian customers, the general steel preference delivery order instructed customers to fill out form PD-32 if they found difficulty in placing an order satisfactorily or if their orders encountered undue delay. The revised form PD-32 just issued asks the customer to give a statement showing the producer's explanation, if any, of (1) failure to meet required delivery dates; and (2) refusal to accept order.

The revised form PD-32 likewise requires the customer to indicate whether delivery date specified is necessary to meet orders on hand, or necessary to replace the material used from stock. In either event, the customer is still required to certify that no date for delivery specified is earlier than required by one or the other circumstance.

The form PD-32A, which is sent to the producer if the priorities division feels that the case justifies such action and which requires the producer to explain why the customer's order was delayed or rejected, remains virtually unchanged under the revision but does require the producer to attach a certified copy of bill of material in connection with the amount and date of each delivery required.

## Chair Maker Switches from Aluminum to Steel

Youngstown

••• Increased use of steel is resulting from a switch by General Fireproofing Co. from aluminum to steel for making chairs, because of the aluminum shortage. The company began shipping the steel chairs recently and is rushing tooling and other preparations to manufacture eight additional types of chairs.

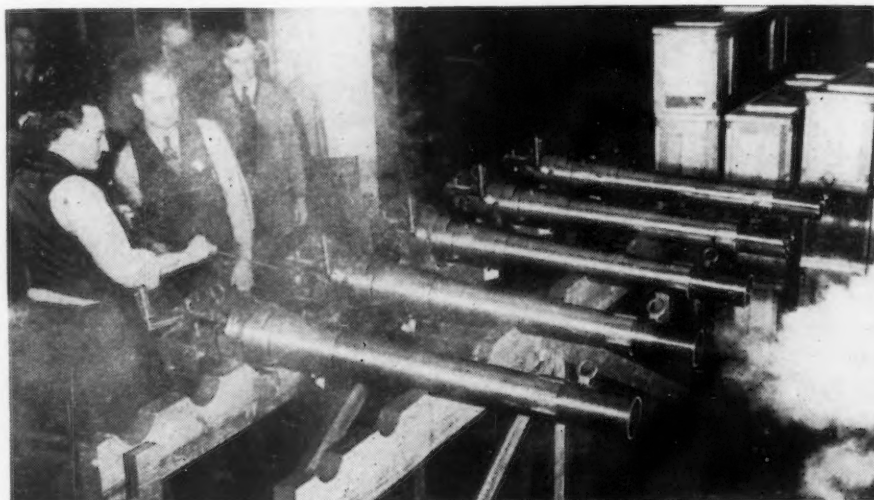


Photo by Wide World

**TESTING HOWITZERS:** Regular shells equipped with primers are fired from these 75-mm. howitzers being built for the Army at the motor department of General Electric Co.'s Erie, Pa., plant.

## 5-Year Steel Program Adopted for Manchuria

Washington

••• A second five-year plan designed to make Manchuria self-sufficient in steel and supply Japan with large quantities of pig iron is reported in dispatches to the Commerce Department. The report said that emphasis is placed on the necessity of becoming independent of American and other foreign sources of scrap iron.

Another dispatch attributes a reduction of Japan's industrial output this year to a scarcity of raw materials and dwindling foreign trade. Numerous measures are being discussed for speeding up iron and steel production but the outlook is not encouraging, the report said.

## Cleveland Employment Shows 12th Monthly Gain

Cleveland

••• Industrial employment here registered its twelfth consecutive monthly increase in June, reported J. W. Vanden Bosch, statistician for the Chamber of Commerce. The 100 representative companies checked in the survey added 2854 workers last month, a gain of 2.97 per cent over the May employment record. The companies are now employing a total of 98,404 workers, nearly 36 per cent more than were on their payrolls 16 months ago, at the start of the defense upswing.

## 100,000 Ton Annual Balkan Chrome Output Now Reich's

London

••• As a result of the occupation of Yugoslavia and Greece, Germany has obtained access to an annual production of 100,000 tons of chrome, as compared with the 28,000 tons annually which she was formerly able to purchase from these countries. Turkish supplies of chrome have been kept out of German hands so far, and the United Kingdom is continuing its policy of preemptive buying.

Although Yugoslavia's and Greece's annual production is 100,000 tons, it is by no means certain that Germany will immediately be able to obtain supplies at this rate, as it is quite possible that some of the mines were damaged in the invasion.

## Workers Ask Pay Rise—U. S. Says Don't Raise Prices

••• A strike of union molders (A.F.L.) closed on July 1 the Ohio Cultivator Co., Bellevue's principal industry. The company has 180 employees. The molders requested a 20 per cent increase in piece rates which range from 45 to 80 cents per hour, and rejected a company offer of a 13 per cent increase. Daniel Selkirk, company president, said federal officials had asked the company not to increase the price of farm implements.



## 500,000 Ton Steel Saving Attributed to Ship Welding

Washington

••• The Maritime Commission claims that it is going to save more than 500,000 tons of steel in the construction of 705 merchant ships by reason of modern designing and the introduction of welding. At the same time the Army has announced that it will save 3000 lb. of aluminum because of changed specifications for 30,000 new dispatch cases. An order just placed by the Quartermaster Corps permits the substitution of nickel steel for aluminum braces to reinforce the canvas dispatch cases. Only 90 lb. of nickel will be used in making the 30,000 cases and they will weigh only slightly more than the aluminum braced type.

In its announcement the Maritime Commission said that if the ships included in its program were built under World War conditions, 2,775,000 net tons of steel would be required. Under the most modern methods of construction, according to the commission, the ships will require about 2,193,000 tons. This is a difference of 579,000 tons rather than 500,000 tons. With steel selling at about \$42 a ton, it is pointed out, the saving amounts to \$24,300,000. The greatest single weight saving advance is attributed to the introduction of welding.

Among the important features in the reported saving of steel is, it is pointed out, the resulting lighter ships, meaning that an extra half million tons of cargo can be carried by the 705 ships. Also, if desired, the commission adds, 227 extra Liberty fleet cargo ships could be constructed out of the steel tonnage saved.

## Aluminum Smelters Get A-10 Rating

Washington

••• Certain secondary aluminum smelters were given a preference rating of A-10 this week by OPM, permitting them to buy aluminum scrap for processing. This rating was assigned only to those smelters doing a substantial quantity of defense work and who have adequate facilities for handling the scrap metal quickly and efficiently.

## Aluminum Scrap Drive Scheduled for July 21-29

Washington

••• Sorting and processing of used aluminum houseware collected during the nation-wide campaign scheduled for July 21 to 29 will be done by the scrap trade, according to specifications of the National Association of Waste Material Dealers, the Office of Production Management has announced.

Scrap dealers will receive the material from the municipalities and will handle it without charge. The dealers will, however, be reimbursed for actual labor or other expenses encountered in preparing the scrap. Part of this reimbursement will be in the form of rejections thrown out during the sorting which will become the dealers' property and will be treated as a credit against his actual expenses.

The collected scrap can be sold only to specified secondary smelters at prices not to exceed the maxima already established for secondary aluminum by the Office of Price Administration and Civilian Supply.

## Firestone Completes First Bofors Gun Mounting

Akron, Ohio

••• At a celebration here June 30 Firestone Tire & Rubber Co. unveiled two Bofors 40-mm. anti-aircraft guns produced within five months after specifications were received. The barrels and firing mechanism are being made by Chrysler Corp. in Detroit.

(Photograph of this gun appears on page 91)

Firestone, which holds a contract for \$20,000,000 worth of these gun mounts, expects to be producing at the rate of five a day by October and 10 a day by next Jan. 1. The gun fires 120 shots a minute at any angle and its barrel moves fast enough to follow a plane diving at 500 miles per hour.

## Spectrochemical Index Out

••• Copies of the second edition of the Index to the Literature on Spectrochemical Analysis, can now be obtained from the American Society for Testing Materials, 260 S. Broad Street, Philadelphia, at \$1.00 a copy.

## Licensing of Factory Agents Proposed at Washington

Detroit

••• A Washington proposal for the licensing of manufacturers' agents is reported in the July issue of the SAE JOURNAL. This report, published under the heading "Might License Factory Agents," says:

"OPM officials believe that well-organized manufacturers' agencies are important in the national defense effort, but they view the field as a mixed blessing because:

"1. Too many have sold their clients in the hinterlands on their prowess to make contacts with the 'right people' in securing government orders.

"2. Too few have staffs of experienced factory engineers who can interpret the manufacturing techniques required by military products in terms of their clients' manufacturing experience, plant, machine tools, and factory supervision.

"3. Too many spend most of their time attempting to contact top OPM executives, rather than discussing detailed problems with the technical assistants in the various divisions of OPM.

"Some spokesmen of official circles in Washington are already talking about licensing manufacturers' agents, basing the requirements on such factors as technical qualifications of the engineers working for the representatives and capacity of the representative to distribute orders to manufacturers who can get equipment produced to the specifications, and on time.

## American Can To Build At St. Paul-Minneapolis

••• American Can Co. announces plans for construction of additional plant facilities in the St. Paul-Minneapolis area. The new plant, to be built at a cost of several million dollars, is designed to take care of the company's rapidly increasing general line and packers can business in Minnesota, Iowa, Montana and part of Wisconsin.

American Can already has 67 factories and machine shops throughout the United States, Canada and Hawaii.

## Jones, Inland Steel Founder, Dies at 85

••• George Herbert Jones, one of the founders of the Inland Steel Co. and noted philanthropist, died July 6 at his home in Chicago. He had been active until a few months ago.

Mr. Jones was born in Brixton, England, 85 years ago and went to Chicago with his father when 15 years old. He started his business career as an office boy with Hall, Kimbark & Co., iron merchants, later becoming sales manager. In 1893 he was one of the organizers of the Inland Steel Co., becoming second president of the firm. He served in that capacity for eight years and in other executive positions until 1921. Since then he had been a director.

At 65 Mr. Jones formed the Hillside Fluorspar Co. with mines at Rosiclare, Ill. At 71 he started the Pershing Quicksilver Co. Until his death he was president of these companies and of the Midwest Forging Co. which he took over when his son, Harold, died some years ago.

Mr. Jones' philanthropies include approximately \$3,000,000 in Inland Steel stock to the Wesley Memorial Hospital and \$650,000 to establish the George Herbert Jones laboratory for chemical research at the University of Chicago.

## Weirton Signs Contract With Independent Union

Weirton, W. Va.

••• Weirton Steel Co. Tuesday of this week, through Tom Millson, president, signed an exclusive collective bargaining contract with the newly formed Weirton Independent Union. According to Robert Foster, temporary president of the union, the accounting firm of Ernst & Ernst certified by matching membership cards against payroll records, that the union possesses "a very large majority of the 9000 to 9500 employees at the Weirton and Steubenville plants of the Weirton Steel Co."

Temporary officers have been elected for the Weirton Independent Union and permanent officials will be elected July 22 to 26.

After installation of new officers the union will "negotiate a definitive written agreement" covering wages, hours, and working conditions. Until that time prevailing wages, hours and working conditions will stay in effect.



## SWOC Charges Evasion

Pittsburgh

••• Granting of recognition to the "Weirton Independent Union" by Weirton Steel Co. is merely an attempt by the company to evade compliance with the recent order of the NLRB, Joseph J. Timko, SWOC subdistrict director charged here following the signing of the contract between the union and Weirton.

According to Timko, charges are now being prepared and will be filed with the labor board to prove the independent union is under domination of Weirton Steel and is being used to slow down bona fide unionism in the Weirton plant.

(See page 110 for further details)

## Full Priority Control Placed on Chromium

Washington

••• Citing the necessity for conserving and building stockpiles of chromium, the OPM early this week placed chromium under full mandatory priority control. Chromium was defined in the order to include ores or concentrates; chromium in pure form, ferrochromium and other combinations prepared for consumption by the steel industry; all chemical combinations in which chromium is an essential and recognizable component; refractory bricks or material, as well as scrap or secondary material containing chromium.

The priority order, effective July 7, provides that all defense orders carry a preference rating of A-10 unless higher ratings are specifically assigned; that monthly deliveries of chromium to be used in manufacturing chemical products be limited to the average monthly consumption of the processor over the 12-month period ending June 30, 1941.

## Millers and Carriers Get Sheet Allocations

Washington

••• Civilian allocation programs calling for emergency preference ratings on 15,000 tons of steel sheets to be used in grain bin construction, and for preferential delivery status to all materials and equipment essential for locomotive, passenger car and bus construction were instituted early this week by OPACS.

The announced allocation of sheets for grain bin construction includes 10,000 tons of galvanized sheets, of which about 6000 tons already have been delivered to grain bin manufacturers, and 5000 tons of black sheets. OPM Director of Priorities Stettinius will allocate the remaining tonnage of galvanized sheets by granting individual preference rating certificates in any manner he finds feasible.

OPACS noted "a serious shortage in storage facilities for grain now being harvested," observed that more than 15,000 tons of sheets could be used for bin construction, but decided to give the 15,000 tons preferential treatment after finding insufficient time to construct all needed bins from materials other than steel.

In granting preferential delivery status for all materials for locomotive, passenger car and bus construction, OPACS placed manufacturers of these items on a par with freight car builders in their prior right, granted on June 10, to materials and equipment over all other civilian uses.

## Illinois Industrialists Will Meet on July 15

Chicago

••• Current problems confronting Illinois industry under national defense program will be the subject of a luncheon-meeting, Tuesday, July 15, at the Hotel LaSalle, sponsored by the Illinois Manufacturers' Association. The speakers will be W. Homer Hartz, chairman of the board of the Illinois Manufacturers' Association, and coordinator, Defense Contract Service and Warren G. Bailey, manager, Priorities District Office.



## OPM Control For Pig Iron Being Studied

Washington

• • • Responding to defense manufacturers' growing complaints of acute shortages of both foundry and steel making pig iron, the OPM Priorities Division is preparing to place this blast furnace product under some form of distribution control. It has not been determined whether the order will take the form of a full priority, a pool or a combination of both. It is expected to be issued in a few days.

Simultaneously mounting complaints are being made by foundries, steel mills, rolling mill equipment makers and other users, of a growing shortage of iron and steel scrap but so far as known no plans are yet under way to ration old material. The belief prevails nevertheless that the OPM will be compelled to follow the course being adopted with respect to pig iron by setting up a distribution control over scrap, or that OPACS will have to further liberalize its recent revised scrap order so as to make it possible to gather tonnages in remote areas.

Complaints of shortages of both pig iron and scrap come from various consuming districts, outstanding of which is the great Pittsburgh area. Instances of defense plants being closed down by reason of pig iron shortages are reported, while it is said that other plants soon will have to either greatly cut production or shut down unless quick relief is given. So far the scrap situation has not become quite so serious as has the pig iron situation but it is reported to be rapidly approaching a parallel condition.

Defense consumers are increasingly critical of the Administration attitude as reflected by OPACS that still insists on civilian allocations to the detriment of defense supplies. Unless there is put into effect at an early date a program of less butter and more guns, predictions are made the defense shortages will become progressively more serious with a further bogging down of preparedness production.

It is argued that the matter being an immediate problem is, therefore, not one of capacity or lack of capacity, since regardless

of either side of the case, capacity could not be created overnight to meet demands. The only answer seen by critics, is the sharp cutting down of civilian supplies, despite the hardships and dislocations that probably will ensue, until the hump in defense demands has been leveled out.

*Further details will be found in the Pig Iron market, page 127*

## Priorities Compliance Section Formed by OPM

Washington

• • • A tacit recognition by priorities officials that the general compliance picture could well be the cause of much concern blossomed this week into a public statement in which Director of Priorities Edward R. Stettinius, Jr., threatened to crack down on violators of priority orders and announced the establishment of a new compliance section within his division. Chief of Inventory Control L. J. Martin, former assistant to the president, Thomas A. Edison, Inc., has been designated head of the new section.

The new division will elicit the aid of the OPM priorities field service to educate and instruct industry by suggesting uniform standards of compliance with orders issued by the priorities division. The priorities division was represented as feeling that "careful" explanation of purposes and requirements of all orders will "settle the average case," but it warned that punitive action will be taken if efforts to obtain voluntary cooperation fail. In such an event, the priorities division threatened to crack down in one of the following ways:

1. By public statements on violations or evasions alleged to have taken place.
2. By restricting supplies of critical materials until compliance is assured.
3. By instituting court action to require compliance.

Although the OPM did not make public complete details of how the new section will function, it was indicated that it will control and supervise compliance cases arising through complaints from within OPM, within the armed services, from industry and the public; and

## Henderson To Sit In On '42 Auto Pricing

Detroit

• • • Evidence that 1942 automobile prices probably will be established by the industry acting in conjunction with Leon Henderson, Federal price administrator, exists in Detroit as a result of recent developments.

General Motors Corp. is reported to have given notice to the Office of Price Administration and Civilian Supply that prices of its 1941 models will not be increased. The current model year ends July 31. Establishment of new prices awaits meetings with Henderson in Washington later this month. Ford Motor Co. is reported to be conferring with OPACS on the question of withholding price increases, although a \$15 boost was made in V-8 models more than a month ago. Chrysler Corp. has refused to rescind recently announced increases.

provision will be made for consultation and advice with industry groups and committees.

It will work closely with priorities committee of the Army and Navy Munitions Board, with field inspectors of the armed services, and other government agencies. Experience with existing orders is expected to be used as a basis for making policy suggestions concerning the form of new orders, and the new section has the job of keeping industry informed on compliance matters in an effort to promote greater understanding and willingness to comply.

## 16.5% Rise in Steel Carloadings Forecast

• • • A rise of 16.5 per cent in carloadings of iron and steel in the 1941 third quarter over the corresponding 1940 period, is forecast by the Shippers' Advisory Boards. The board estimates, announced by the Association of American Railroads, predicts steel traffic of 566,743 cars in the present quarter compared with 486,382 cars in the third quarter of last year. Coal and coke loadings are estimated at 2,138,622 cars against 1,827,741, and ore loadings at 1,020,962 against 875,445.

• **James MacBeth, Jr.**, has been appointed manager of pig iron sales of Jones & Laughlin Steel Corp., Pittsburgh, and **B. E. Stewart**, manager of by-product sales, both succeeding the late M. W. St. John. All of Mr. MacBeth's business experience has been with Jones & Laughlin, having started with the company in the order department in 1915 after attending Carnegie Institute of Technology. He worked for a short time in both the Philadelphia and Washington district offices and in 1919 returned to Pittsburgh to the by-product sales department.

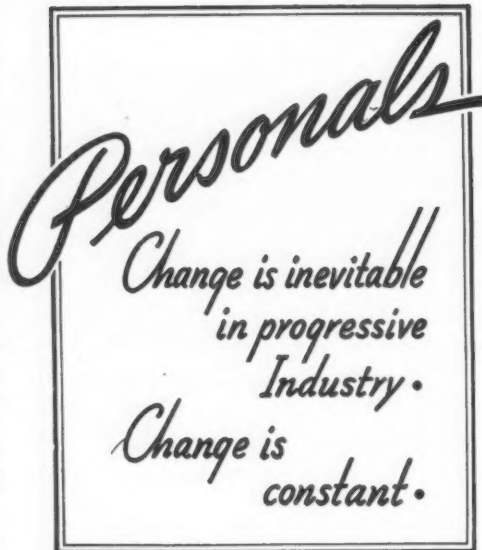
Mr. Stewart has been head chemist of the by-product laboratory of the Aliquippa works since 1937. A graduate of West Virginia University, Mr. Stewart was chemist for a number of coal companies before joining the staff of the Jones & Laughlin company.

• **A. J. Paddock**, heretofore manager of operations at the Elmira, N. Y., works of American Bridge Co., has been transferred to Gary works as manager of operations there, succeeding **P. W. Seyl**, who has retired after 24 years in that post.

Mr. Paddock is a graduate of the University of Michigan. He joined American Bridge Co. in 1929 as a timekeeper in the erecting department. After being engaged in special duties for the



**JAMES MacBETH, JR.**, manager of pig iron sales of Jones & Laughlin Steel Corp.



vice-president in charge of manufacturing operations, he was transferred to the Elmira plant in 1936, as assistant to manager. He became manager of the plant in 1937.

In 1896 Mr. Seyl entered the employ of the Lassig Bridge & Iron Co., which was merged with the American Bridge Co. in 1900. From 1903 until 1909 he was superintendent of the Jackson and Corbett Bridge & Iron Works. In 1910 he re-entered the service of the American Bridge Co. as superintendent of the Gary plant, and in 1913 he was made assistant manager. He has been manager of the Gary plant since 1917.

**R. C. Robinson**, assistant manager of the Elmira plant becomes manager, succeeding Mr. Paddock. **G. K. Manzer**, assistant rate foreman at the Gary plant, is transferred to Elmira as assistant manager of the plant.

Other changes announced by American Bridge Co. are as follows: **B. O. Bateman**, assistant to vice-president in charge of manufacturing operations, is retiring after more than 39 years of continuous service with the company. **J. C. Augsburg**, assistant manager of the Gary plant has succeeded Mr. Bateman. **J. M. Martin**, manager of the Shiffler plant in Pittsburgh, is retiring after more than 41 years of service. He is succeeded by **H. B. Hill**, plant engineer of the Shiffler plant.

• **G. R. Prout**, since 1939 manager of sales of the industrial control section of General Electric Co., Schenectady, has been appointed manager of the industrial control

division. **R. S. Glenn** has been made manager of sales, industrial control division. Mr. Prout is a graduate of Massachusetts Institute of Technology and joined G-E in the small motor department at Lynn, Mass., in 1923. **W. C. Yates** has been relieved of his present duties as manager of the control and renewal parts division of the industrial department to devote more time to his duties as assistant manager of the department.

• **Edward J. McCann**, formerly superintendent, has been appointed general works manager, South Chester Tube Co., South Chester, Pa. Mr. McCann has been with this company for 21 years, starting as night superintendent. Previously he was with the Reading Iron Co., where he worked his way up from office boy to manager of the planning department.

**W. C. Hale**, formerly with the Gypsy division, Gulf Oil Corp., Tulsa, Okla., and more recently in the sales department of South Chester Tube, has been appointed assistant to the general works manager.

• **Paul Fielden**, connected with the Norton Co., Worcester, Mass., for 21 years as assistant credit manager and credit manager, has been made director of purchases. **Marcus W. White** retains the position of purchasing agent, which he has held for many years.



**A. J. PADDOCK**, manager of operations of Gary plant of American Bridge Co.



• **William F. Crawford**, since 1937 vice-president of the Edward Valve & Mfg. Co., East Chicago, Ind., has been elected president, succeeding the late W. W. Crawford. The new president has been associated with the organization since 1931 and has had active charge of manufacturing, research, advertising and sales promotion activities for some time.

• **J. Earl Romer**, for the past five years associated with Bliss & Laughlin, Inc., Chicago, has been made Cleveland district manager, succeeding **A. W. Schultz**, who has resigned. He has been a member of that district's sales staff for over three years.

• **Samuel Dunlap**, auditor and director of the American Steel & Wire Co., Cleveland, has retired. He joined Illinois Steel Co., later a part of U. S. Steel in 1895 and after the formation of the American Steel & Wire Co. he joined that company as chief clerk at Crown Point, N. Y. He was made auditor in 1936.

• **Kenneth Kemp** has been named manager of Precision Parts Co., Holland, Mich., succeeding **Herbert J. Francis**. Other plant officials who will work with Mr. Kemp are **Richard Rowe**, general superintendent, **Wilbur Wyatt**, foundry superintendent, **Robert Bell**, production manager, **Ira A. Antles**, personnel manager, and **Elmer Shoup**, chief inspector.

• **Paul F. Broderick**, former Department of Labor conciliator, is now personnel director for Murray-Ohio Mfg. Co., Cleveland.

• **Frank O. Wallene**, former City of Cleveland utilities director, has been named chief engineer of the Stowe stoker division of the Johnston & Jennings Co., Cleveland.

• **Scott M. Eckis**, the Hoover Co., has been elected president of the Foremen's Club of Stark County, Ohio. Vice-presidents include: **H. M. Wearstler**, Morgan Engineering Co.; **A. M. Clark**, Hercules Motors Corp.; **Ben E. Barnes**, Transue-Williams Forging Corp.; **A. J. Ryder**, Griscom-Russell Co. Secretary is **H. S. Ernst**.

• **Henry Wilder** of Heald Machine Co., Worcester, has been appointed regional chairman for the Worcester, Mass., district of the Emer-

gency Defense Training Committee, American Society of Tool Engineers.

• **E. W. Upham**, of Detroit, chief metallurgist of the engineering department, Chrysler Corp., has been named to the executive committee of the American Society for Testing Materials.

• **A. J. Altz**, chief draftsman for Chevrolet division of General Motors Corp., recently discussed the role of the draftsman in defense planning and some of the problems confronting the young engineer

about to take his place in industry, in an address before the national convention of the Society for Promotion of Engineering Education at Ann Arbor, Mich.

• **Harry B. Lose**, formerly assistant superintendent of construction for the Koppers Co., engineering and construction division, has been appointed superintendent, succeeding the late Roy L. Smith. Mr. Lose received his technical training at Carnegie Institute of Technology and joined the Koppers company in 1916 as a layout engineer.

## Obituary

• **Fred N. Brauer**, chief of ordnance, Watertown Arsenal, and nationally known expert on steels and alloys, died at a Brookline, Mass., hospital, June 26. On inactive status 12 years, due to personal injuries, he was often called for ordnance problem consultations. Chief engineer, 240 mm. howitzer division, he had charge of design and production of that field piece and its huge carriage. Mr. Brauer was born at the navy yard, Horton, Norway, 77 years ago.

• **Otto V. Kruse**, general sales manager of the Baldwin Locomotive Works, died at his home in St. Davids, Pa., on July 1, aged 54 years. Mr. Kruse was graduated from Cornell University, class of 1909, with the degree of Civil Engineer. He was active in the hydroelectric industry up to 1917, at which time he became associated with Larner Engineering Co. and with the William Cramp & Sons Ship & Engine Building Co. as consulting engineer. He was subsequently appointed general sales manager of the miscellaneous machinery business of Cramp's, including I. P. Morris hydraulic turbines and De La Vergne diesel engines. In 1931 the Baldwin Locomotive Works acquired this business, and Mr. Kruse later became general sales manager and finally

assistant general manager of the division of this business known as Baldwin-Southwark Corp. In 1939 he was made general sales manager of the Baldwin Locomotive Works, a position which he held at the time of his death.

• **Frank L. Main**, vice-president of the Thermoid Co., was buried June 23 at Detroit. He was 51 years old.

• **Gail Bacheller**, of Woodall Industries, Detroit, died recently in Detroit. Mr. Bacheller, born in Nashville, Mich., in 1885, went into the tool and die business at Big Rapids, Mich., when he was a young man and later was employed by Buick at Flint, the old Flanders plant in Pontiac and with Studebaker in Detroit. He served in the research department of Studebaker in Detroit and South Bend before becoming associated with Woodall Industries.

• **Frank Edward Rice**, vice-president of the American Tap Bush Co., was buried June 25 in Detroit. Mr. Rice, who was born in Detroit in 1882, had been associated with the American Tap Bush Co. for 40 years. He also was vice-president and factory manager of the Kay Salt Co. and consulting engineer of the old Gearless Differential Co.

• **William G. Cram**, Elm Grove, Wis., service engineer for the Kearney & Trecker Corp., Milwaukee, died of a heart attack in a Dayton, Ohio, hotel June 21, aged 43 years. He was supervising the installation of milling equipment at a new airplane plant in Dayton.

## How to Produce High-Silicon Acid- Resisting Castings

(CONCLUDED FROM PAGE 54)

The main point the coremaker has to keep before him is that the core has to be quickly broken up after the casting of the mold. The reason for this will be fully realized when the stripping operation is explained. For cores made with a barrel, the usual trestle practice is followed, straw or wood rope used, clayed up in the usual manner and then loamed up to size. For core-box work, sea-sand cores with an oil-sand binder are essential. This is necessary not only for allowing contraction to take place but also to make less laborious the mold stripping operation after casting.

### Casting

This operation, with cupola-melted metal, is undoubtedly a most important one. Referring back to the analysis at the beginning of the article, it will be noticed that the metal must not contain more than 0.80 per cent carbon; but as cast iron scrap is used in the proportion of 2 to 1 of ferro-silicon, the total carbon in the metal is approximately 2.50 per cent.

The following method is used to reduce the carbon content: the metal is tapped from the furnace at 3090 to 3270 deg. F. It is run into shanks or ladles which after being filled are allowed to stand, while the metal is constantly agitated with bars. As the temperature of the metal falls the carbon is thrown out on the surface in the form of graphite. This has to be constantly raked off the surface of the metal. When the temperature of the metal has dropped to approximately 2550 deg. F., the carbon is then reduced to the figure mentioned in the analysis and the metal is ready for pouring.

If the electric furnace is used for melting, the above procedure is unnecessary. The use of the electric

furnace enables plate and girder steel scrap to be used with the ferro-silicon. As this scrap is obviously low in, or free from, carbon, the metal can be used for casting immediately it is released from the furnace. This is one very natural advantage the electric furnace has over the cupola.

### Stripping the Casting

Here is another operation where no time should be lost. As soon as the castings are set, they have to be stripped from the mold—all core irons being immediately broken out—and placed in annealing furnaces before they go black. The castings must, in most cases, retain some redness in color as they are being put into the annealing furnace, otherwise the sudden change in temperature would have a tendency to crack them.

The reader will fully appreciate the necessity of teamwork during the stripping operation with castings of 200 to 4000 lb. Everything has to be carefully planned beforehand and allowance made for contingencies.

### Annealing

This process is the one which if efficiently carried out will permit high-silicon iron castings to be successfully manufactured. In the writer's opinion it is the most important of all the processes from the point of view of preventing cracked castings in manufacture and giving longer life and more efficient working quality when put to work in the field.

Two types of furnaces are used—one being of the muffle type with a door on the front which rises and falls as required, and is counter-balanced by a balance weight. On the front of the furnace is a hearth, level with the floor of the furnace, i. e., about 2 ft. from the ground. The castings are brought from the molding floor after being stripped and are placed on the hearth to facilitate pushing into the furnace. This type of furnace is suitable for castings of light to medium section, say, up to  $\frac{3}{4}$  in.

When the casting and stripping operations are finished, the furnace

is sealed and heated up to 1380 to 1560 deg. F. It is held at this heat for 4 to 6 hr. The furnace is then allowed to cool to room temperature and the castings are ready to send to the dressing shop. The cycle of operations takes approximately 24 to 36 hr.

For larger castings both in size and section, a soaking-pit type of furnace is used. It is approximately 10 x 10 x 9 ft. The door is on the top and is lifted off by crane power. The castings are carried and lowered into the furnace also by crane power. Great care and skill are required in the packing of this furnace. The castings must be so arranged that they cannot distort under heat, and also the hot gases must have free circulation round the castings so that even heating and cooling are obtainable. After the furnace has been filled the cover is placed in position and sealed. The temperature is then raised to between 1380 and 1560 deg. F., and kept at this heat for 12 hr. After 36 hr. the dampers are lifted and the castings allowed to cool to room temperature. The whole operation takes 72 to 96 hr., according to the size and type of casting.

### Dressing

The castings have to be handled with exceptional care in the dressing shop. Owing to the hard and brittle nature of the metal the castings cannot be chipped or filed. All runners and fins have to be cleaned off with a grinding wheel, either flexible or fixed according to the nature of the work.

### Machining

The metal is so hard that it is not practicable to machine the castings; grinding is the only method that can be used. By the adaptation of lathes, vertical boring mills, planing machines, etc., some very fine grinding work can be done. No holes can be drilled in the metal. All bolt holes, etc., have to be cast in.

It is also important to note that double contraction allowance must be made in construction of patterns and coreboxes.



# Metal Working Activity

. . . Latest Data Assembled by The Iron Age

From Recognized Sources. In Net Tons.

	May 1941	April 1941	April 1940	4 Months 1941	4 Months 1940
<b>Steel Ingots:</b>					
Monthly output <sup>a</sup> .....	7,101,759	6,757,728	4,100,722	27,097,597	18,786,682
Average weekly output <sup>a</sup> .....	1,603,106	1,575,228	955,879	1,231,709	853,440
Per cent of capacity <sup>a</sup> .....	99.3	97.6	61.2	97.9	69.9
<b>Pig Iron:</b>					
Monthly output <sup>b</sup> .....	4,599,966	4,334,267	3,137,019	18,269,837	13,751,020
<b>Raw Materials:</b>					
Coke output <sup>c</sup> .....	5,387,054	4,567,315	4,086,747	20,597,704	17,464,005
Lake ore consumed <sup>d</sup> .....	6,232,213	5,802,088	3,034,853	24,217,803	17,553,767
Scrap iron consumed .....	.....	4,406,000	2,548,000	17,518,000	11,669,000
<b>Castings:</b>					
Malleable, orders <sup>e</sup> .....	.....	84,751	35,290	328,188	146,359
Steel, orders <sup>e</sup> .....	.....	152,007	41,353	493,851	161,999
<b>Finished Steel:</b>					
Trackwork shipments <sup>a</sup> .....	11,012	11,751	7,654	36,784	29,760
Fabricated shape orders <sup>f</sup> .....	165,186	212,320	73,780	872,167	382,672
U. S. Steel Corp. shipments <sup>g</sup> .....	1,745,295	1,687,674	6,638,945	907,904	3,994,657
<b>Fabricated Products:</b>					
Automobile production <sup>h</sup> .....	518,736	462,270	432,746	1,956,592	1,692,677
Steel furniture shipments <sup>e</sup> , value. ....	.....	.....	\$2,008,428	.....	\$8,960,330
Steel boiler orders <sup>e</sup> (sq. ft.) .....	.....	2,339,037	878,259	9,614,656	2,731,490
Locomotives ordered <sup>i</sup> .....	128	68	77	392	181
Freight cars ordered <sup>i</sup> .....	19,221	16,091	2,456	43,539	7,534
Foundry equipment index <sup>k</sup> .....	298.7	377.2	145.2	304.1†	153.3†
Gear sales index .....	273	292	128	275.5†	120.5†
<b>Non-Ferrous Metals (U. S. only)</b>					
Lead shipments <sup>l</sup> .....	69,382	59,169	46,563	231,829	171,967
Lead stocks <sup>l</sup> .....	34,018	42,899	63,463	.....	.....
Zinc shipments <sup>m</sup> .....	63,638	62,974	46,803	249,041	202,624
Zinc stocks <sup>m</sup> .....	8,305	7,311	78,396	.....	.....
Tin deliveries <sup>n</sup> .....	10,490	13,955	7,855	55,002	33,479
Refined copper deliveries <sup>o</sup> .....	141,801	123,580	68,665	490,457	287,684
Refined copper stocks <sup>o</sup> .....	95,568	97,761	169,120	.....	.....
<b>Exports:</b>					
Total iron and steel <sup>p</sup> .....	.....	515,657	612,906	2,208,161	2,531,708
All rolled and finished steel <sup>p</sup> .....	.....	273,897	270,330	1,128,633	1,208,344
Semi-finished steel <sup>p</sup> .....	.....	135,175	96,609	778,313	362,820
Scrap <sup>p</sup> .....	.....	120,152	221,152	293,968	850,253
<b>Imports:</b>					
Total iron and steel <sup>p</sup> .....	.....	1,526	6,674	3,051	26,784
Pig iron <sup>p</sup> .....	.....	0	286	0	4,815
All rolled and finished steel <sup>p</sup> .....	.....	1,336	2,322	2,796	8,379

Sources of data: <sup>a</sup> American Iron and Steel Institute; <sup>b</sup> THE IRON AGE; <sup>c</sup> Bureau of Mines; <sup>d</sup> Lake Superior Iron Ore Association; <sup>e</sup> Bureau of the Census; <sup>f</sup> American Institute of Steel Construction; <sup>g</sup> United States Steel Corp.; <sup>h</sup> Preliminary estimates by THE IRON AGE—Final figures from Bureau of the Census, U. S. only; <sup>i</sup> Railway Age; <sup>j</sup> National Machine Tool Builders Association; <sup>k</sup> Foundry Equipment Manufacturers Association; <sup>l</sup> American Bureau of Metal Statistics; <sup>m</sup> American Zinc Institute; <sup>n</sup> New York Commodity Exchange; <sup>o</sup> Copper Institute; <sup>p</sup> Department of Commerce; <sup>q</sup> Institute of Scrap Iron and Steel; <sup>r</sup> American Gear Manufacturers Association.

† Monthly averages.

# The Iron Age Comparison of Prices

Advances Over Past Week in Heavy Type; Declines in Italics

	July 8, 1941	July 1, 1941	June 10, 1941	July 9, 1940		July 8, 1941	July 1, 1941	June 10, 1941	July 9, 1940
<b>Flat Rolled Steel:</b> (Cents Per Lb.)					<b>Pig Iron:</b> (Per Gross Ton)				
Hot rolled sheets .....	2.10	2.10	2.10	2.10	No. 2 fdy., Philadelphia..	\$25.84	\$25.84	\$25.84	\$24.84
Cold rolled sheets .....	3.05	3.05	3.05	3.05	No. 2, Valley furnace....	24.00	24.00	24.00	23.00
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50	No. 2, Southern Cin'ti...	24.06	24.06	24.06	23.06
Hot rolled strip .....	2.10	2.10	2.10	2.10	No. 2, Birmingham.....	20.38	20.38	20.38	19.38
Cold rolled strip .....	2.80	2.80	2.80	2.80	No. 2, foundry, Chicago†	24.00	24.00	24.00	23.00
Plates .....	2.10	2.10	2.10	2.10	Basic, del'd eastern Pa...	25.34	25.34	25.34	24.34
<b>Tin and Terne Plate:</b> (Dollars Per Base Box)					Basic, Valley furnace....	23.50	23.50	23.50	22.50
Tin plate .....	\$5.00	\$5.00	\$5.00	\$5.00	Malleable, Chicago† ....	24.00	24.00	24.00	23.00
Manufacturing ternes ...	4.30	4.30	4.30	4.30	Malleable, Valley .....	24.00	24.00	24.00	23.00
<b>Bars and Shapes:</b> (Cents Per Lb.)					L. S. charcoal, Chicago..	31.34	31.34	31.34	30.34
Merchant bars .....	2.15	2.15	2.15	2.15	Ferromanganese‡ .....	120.00	120.00	120.00	120.00
Cold finished bars .....	2.65	2.65	2.65	2.65	†The switching charge for delivery to foundries in the Chi- cago district is 60c. per ton. ‡For carlots at seaboard.				
Alloy bars .....	2.70	2.70	2.70	2.70	<b>Scrap:</b> (Per Gross Ton)				
Structural shapes .....	2.10	2.10	2.10	2.10	Heavy melt'g steel, P'gh.	\$20.00	\$20.00	\$20.00	\$19.75
<b>Wire and Wire Products:</b> (Cents Per Lb.)					Heavy melt'g steel, Phila.	18.75	18.75	18.75	19.00
Plain wire .....	2.60	2.60	2.60	2.60	Heavy melt'g steel, Ch'go	18.75	18.75	18.75	17.375
Wire nails .....	2.55	2.55	2.55	2.55	Carwheels, Chicago .....	....	....	....	19.00
<b>Rails:</b> (Dollars Per Gross Ton)					Carwheels, Philadelphia.	....	....	....	21.75
Heavy rails .....	\$40.00	\$40.00	\$40.00	\$40.00	No. 1 cast, Pittsburgh...	22.00	22.00	22.00	20.75
Light rails .....	40.00	40.00	40.00	40.00	No. 1 cast, Philadelphia..	24.00	24.00	24.00	21.75
<b>Semi-Finished Steel:</b> (Dollars Per Gross Ton)					No. 1 cast, Ch'go*.....	21.00	21.00	21.00	16.75
Rerolling billets .....	\$34.00	\$34.00	\$34.00	\$34.00	*Changed to gross ton basis.				
Sheet bars .....	34.00	34.00	34.00	34.00	<b>Coke, Connellsville:</b> (Per Net Ton at Oven)				
Slabs .....	34.00	34.00	34.00	34.00	Furnace coke, prompt...	\$6.125	\$6.125	\$6.125	\$4.25
Forging billets .....	40.00	40.00	40.00	40.00	Foundry coke, prompt...	6.875	6.875	6.875	5.25
<b>Wire Rods and Skelp:</b> (Cents Per Lb.)					<b>Non-Ferrous Metals:</b> (Cents per Lb. to Large Buyers)				
Wire rods .....	2.00	2.00	2.00	2.00	Copper, electro., Conn.*..	12.00	12.00	12.00	11.50
Skelp (grvd) .....	1.90	1.90	1.90	1.90	Copper, Lake, New York	12.00	12.00	12.00	11.50
					Tin (Straits), New York.	53.125	52.875	53.00	51.25
					Zinc, East St. Louis.....	7.25	7.25	7.25	6.25
					Lead, St. Louis .....	5.70	5.70	5.70	4.85
					Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50
					*Mine producers only.				

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 136-142 herein. On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

## Composite Prices

FINISHED STEEL				PIG IRON				SCRAP STEEL			
July 8, 1941 .....	2.261c.	a	Lb.	.....	\$23.61	a	Gross Ton	.....	\$19.17	a	Gross Ton
One week ago.....	2.261c.	a	Lb.	.....	\$23.61	a	Gross Ton	.....	\$19.17	a	Gross Ton
One month ago.....	2.261c.	a	Lb.	.....	\$23.61	a	Gross Ton	.....	\$19.17	a	Gross Ton
One year ago .....	2.261c.	a	Lb.	.....	\$22.61	a	Gross Ton	.....	\$18.71	a	Gross Ton
High		Low		High		Low		High		Low	
1941.....				\$23.61, Mar. 20	\$23.45, Jan. 2			\$22.00, Jan. 7	\$19.17, Apr. 10		
1940.....	2.261c., Jan. 2	2.211c., Apr. 16		23.45, Dec. 23	22.61, Jan. 2			21.83, Dec. 30	16.04, Apr. 9		
1939.....	2.286c., Jan. 3	2.236c., May 16		22.61, Sept. 19	20.61, Sept. 12			22.50, Oct. 3	14.08, May 16		
1938.....	2.512c., May 17	2.211c., Oct. 18		23.25, June 21	19.61, July 6			15.00, Nov. 22	11.00, June 7		
1937.....	2.512c., Mar. 9	2.249c., Jan. 4		23.25, Mar. 9	20.25, Feb. 16			21.92, Mar. 30	12.92, Nov. 10		
1936.....	2.249c., Dec. 28	2.016c., Mar. 10		19.74, Nov. 24	18.73, Aug. 11			17.75, Dec. 21	12.67, June 9		
1935.....	2.062c., Oct. 1	2.056c., Jan. 8		18.84, Nov. 5	17.83, May 14			13.42, Dec. 10	10.33, Apr. 29		
1934.....	2.118c., Apr. 24	1.945c., Jan. 2		17.90, May 1	16.90, Jan. 27			13.00, Mar. 13	9.50, Sept. 25		
1933.....	1.953c., Oct. 3	1.792c., May 2		16.90, Dec. 5	13.56, Jan. 3			12.25, Aug. 8	6.75, Jan. 3		
1932.....	1.915c., Sept. 6	1.870c., Mar. 15		14.81, Jan. 5	13.56, Dec. 6			8.50, Jan. 12	6.43, July 5		
1931.....	1.981c., Jan. 13	1.883c., Dec. 29		15.90, Jan. 6	14.79, Dec. 15			11.33, Jan. 6	8.50, Dec. 29		
1930.....	2.192c., Jan. 7	1.962c., Dec. 9		18.21, Jan. 7	15.90, Dec. 16			15.00, Feb. 18	11.25, Dec. 9		
1929.....	2.236c., May 28	2.192c., Oct. 29		18.71, May 14	18.21, Dec. 17			17.58, Jan. 29	14.08, Dec. 3		
Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.											
Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.											
Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.											



# Summary of the Week

• Operations rebound 5 points to 98.5 per cent but shortages of scrap and pig iron threaten continuance of this rate . . . Scrap reported bought for export at price above government domestic ceiling . . . Treasury to seek 500,000 tons of steel for British.

STEEL plant operations this week rebounded to 98.5 per cent of capacity, a five point advance from the Independence Day week's rate of 93.5 per cent, but still under the pre-holiday level of 100.5 per cent. Whether ingot production can show much improvement during the next month or, indeed, whether it can hold, is rapidly becoming a matter of speculation, not merely because melting operations are so high but because the steel industry apparently is not far from a situation in which it will face twin shortages of pig iron and scrap.

While production of coke pig iron in June, according to THE IRON AGE compilation, reached 4,553,165 net tons compared with 4,599,966 tons in May, and the operating rate for the industry's blast furnaces was 95.9 per cent against 93.8 per cent in May, the supply of iron is far from adequate. In answer to defense manufacturers increasing complaints of acute shortages of both foundry and steelmaking iron, the OPM priorities division is expected to place these blast furnace products under some form of distribution control. It has not been determined whether the order will take the form of full priorities, a pool, or both.

SIMILAR confusion now exists in the scrap market, where a new element of uncertainty has been injected in the form of resumption of exports to Great Britain under the Lease-Lend Act. Dealers covering on an export order are reported to have paid slightly over the Government-fixed ceiling in the New York area. This situation is likely to force an answer to the question of whether it is more important to keep British plants going than domestic plants. Mills and scrap dealers generally are emphasizing the need for establishment of a set policy with respect to scrap exports. In some steel producing areas in the East and Midwest, predictions are being made that ingot output will be curtailed in from 30 to 45 days unless supplies increase. Meanwhile an IRON AGE correspondent in England reports criticism there of the British Government's policy in assuming that existence of reserve scrap stocks at steel plants is not necessary and of its slowness in shipping material gathered in village dump campaigns in that country to the plants.

Within a few days the Treasury Department is expected to take bids on more than 500,000 tons of steel for the British, a large share of which is expected to be small billets and other semi-finished items. Deliveries will be asked for in August and September, which suggests a further restriction in non-defense

business, since completion of the order during July and August will come at a time when American mills are jammed with domestic defense orders. It is now estimated that such defense orders directly or indirectly are taking an average of 60 per cent of current steel production, with the rate for some companies reaching 75 per cent. While the outpouring of new orders has subsided to some extent, the volume is still greater than production or shipments. Recent allocation programs announced for civilian requirements by OPACS lack significance for the time being, since the amount of material carrying preference ratings is taking the larger share of steel production.

A BRIGHT spot in the metals supply picture is news that three railroad car building plants which have been shut down from six to eight weeks because of lack of plates have now obtained steel and are operating at nearly 50 per cent. These plants are: Pullman Standard Car Mfg. Co., Butler, Pa.; Ralston Steel Car Co., Columbus, Ohio, and American Car & Foundry Co., Huntington, W. Va. A fourth plant, that of Greenville Steel Car Co., Greenville, Pa., was expected to resume operations this week. Loss to railroads from these shutdowns is estimated at 7000 cars. Cars ordered from freight car shops or car builders during June reached 27,265, making a total for the first six months this year of 98,049, one of the heaviest half year bookings in history.

Fabricated structural steel awards for the week are slightly lower at 32,000 tons, with new projects rising to 15,700 tons from 15,575 tons last week. Reinforcing steel awards declined to 6135 tons from 10,425 tons a week ago.

# The Industrial Pace . . .

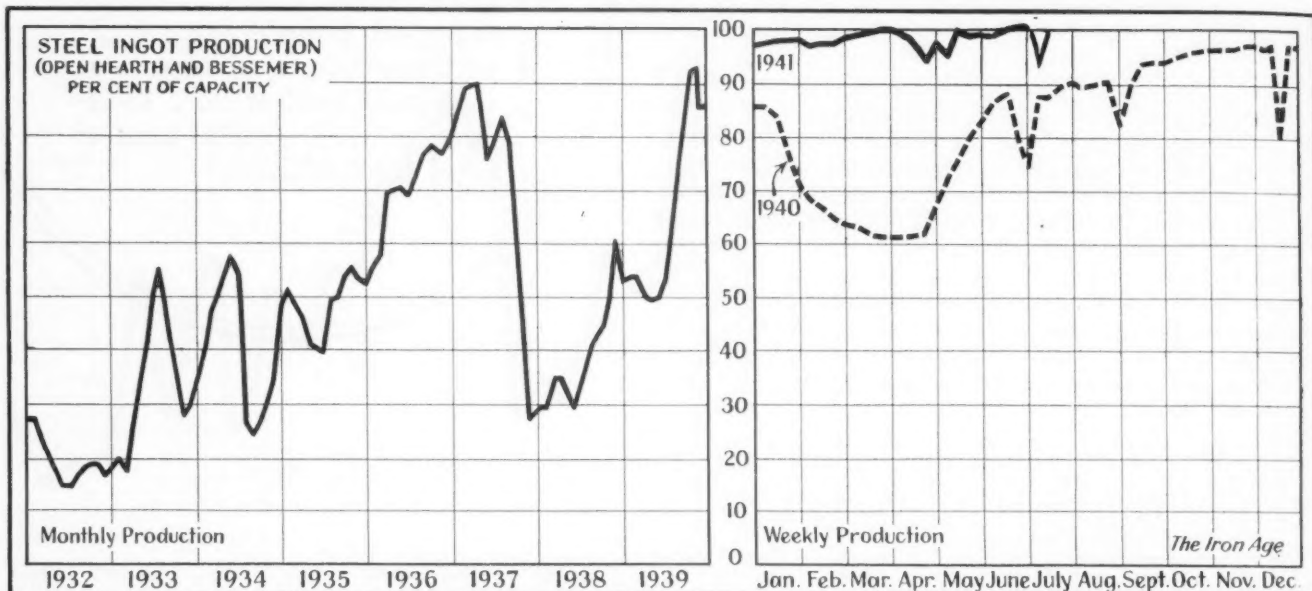
The steady rising trend of THE IRON AGE index of capital goods activity was interrupted in the past week by a slight curtailment in production activities due to the July 4th holiday. This curtailment, which lowered the index 1.1 points to 118.5 per cent of the base years, was substantially less than the loss due to the Independence Day holiday in 1940 when the index declined 7.2 points.

Chief holiday influence was discernible in the automobile and steel series, the other three factors of the index showing moderate counterseasonal improvements. In addition

to the normal holiday letdown, the automobile factor also showed signs of a summer slackening somewhat stronger than the usual seasonal decline.

The Pittsburgh series gained 3.8 points in the past week, to establish a new high for the current year. The construction component, after allowance for the short week, is still holding to the high levels of the past month. An advance of 9.2 points in the lumber carloadings series brought that factor up to a new high of 85.1 for the current year.

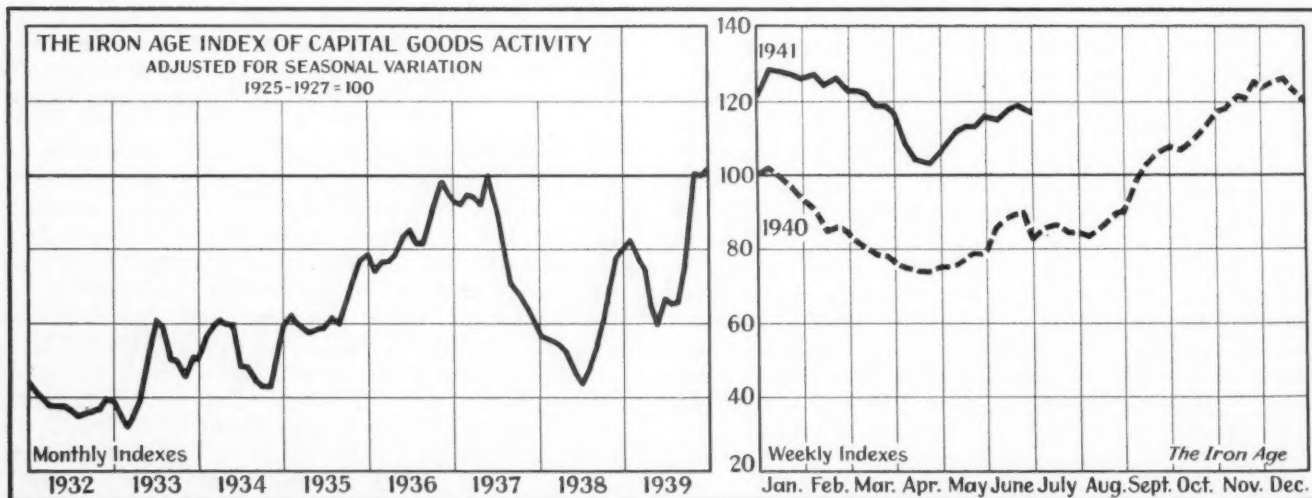
## Production Recovers 5 Points to 98.5%



District Ingot Production, Per Cent of Capacity		Pittsburgh	Chicago	Valleys	Philadelphia	Cleveland	Buffalo	Wheeling	Detroit	Southern	S. Ohio	Western	St. Louis	East-ern	Aggregate
Current Week ..		99.0	100.5	99.0	97.5	99.0	106.0	90.0	112.5	95.0	109.0	102.5	111.0	95.5	98.5
Previous Week..		96.0*	97.0*	89.0	93.0	93.0	100.0	86.0	89.5	90.0	98.5	95.0	103.0	87.0	93.5

\*Revised.

## Index Off Slightly Due to Holiday

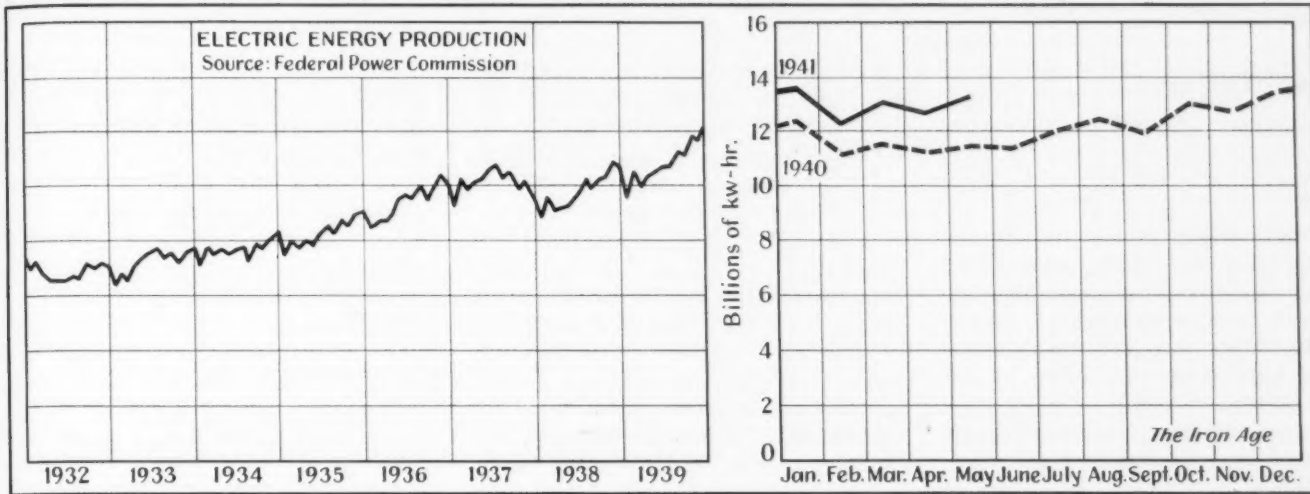


Component	Week Ended	July 5	June 28	June 7	July 6, 1940	July 6, 1929
Steel ingot production <sup>1</sup>		137.1	147.5	140.1	112.2	137.1
Automobile production <sup>2</sup>		114.5	121.8	118.1	61.7	108.5
Construction contracts <sup>3</sup>		120.5	118.9	111.3	67.2	120.4
Forest products carloadings <sup>4</sup>		85.1	75.9	77.4	65.9	117.6
Pittsburgh output and shipments <sup>5</sup>		135.4	131.6	131.4	107.0	127.9
COMBINED INDEX		118.5	119.6	115.7	82.8	122.3

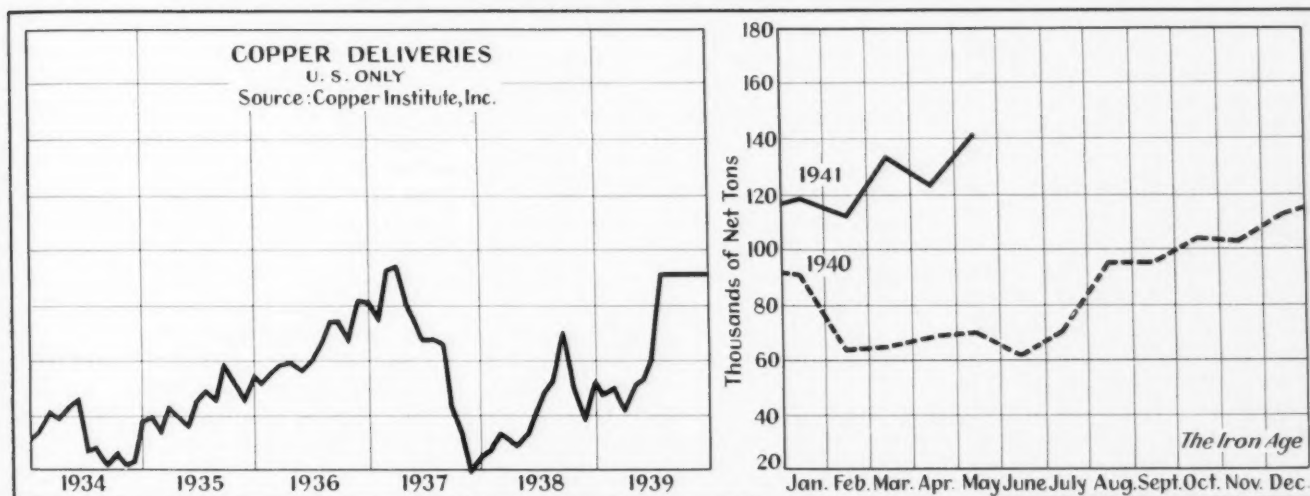
Sources: <sup>1</sup> THE IRON AGE; <sup>2</sup> Ward's Automotive Reports; <sup>3</sup> Engineering News-Record; <sup>4</sup> Association of American Railroads; <sup>5</sup> University of Pittsburgh. Indexes of forest products carloadings and activity in Pittsburgh area reflect conditions as of week ended June 28. Other indexes cover week of July 5.



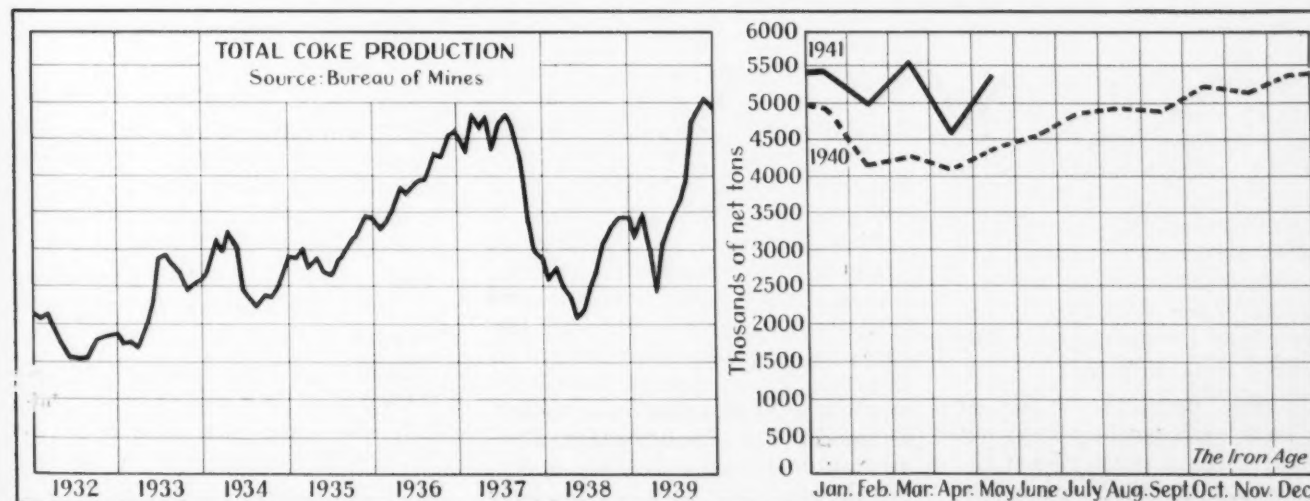
## May Electric Power Production Up 1.5%



## May Copper Deliveries Set New Record



## Coke Output Rebounds After Coal Strike



# Market News

...THE WEEK'S ACTIVITIES IN IRON AND STEEL

## New Business

*... Plants feeding big Ohio shell-loading factory require more steel*

June specifications at PITTSBURGH were only slightly below the May volume and were considerably greater than production or shipments. Mills are constantly confused by the great number of orders carrying preference ratings and the situation is becoming so involved that the main question being asked is "which orders shall be filled first." A considerable volume of tonnage carrying priorities, although not needed for immediate shipment, is already building up rolling mill schedules far into the future. As additional business comes in, advanced rolling mill schedules will be further increased, which means that civilian requirements, regardless of the OPACS allocation program, in many cases stand only a slim chance of being fulfilled.

Shell making is entering a more active phase which will react upon steel shipments, reports CLEVELAND. The big \$57,000,000 loading plant at Ravenna, Ohio, expects to start part operation this month and will be fed by scores of plants in Northern Ohio and Western Pennsylvania, each of which will be requiring steel on an ascending scale as time goes on. Direct defense output, at present somewhere in the neighborhood of 30 per cent of capacity, will rise with the 35 per cent now going into indirect defense. Construction shows no let-up.

Everyone in the steel industry at CLEVELAND seems to be an expeditor this summer, either hurrying orders for defense customers or hastening items needed for steel mills' own production. One big iron and steel producer is passing out about 1400 orders per day, and encountering much difficulty in obtaining some of the items. Red tape seems to be growing.

Warehouse operators, many of whom have been passing steel out freely for defense work, report the need of governmental assistance in

obtaining replacements. Clarification also is needed concerning the status of farm equipment.

New buying continues to decline in the CHICAGO district. One producer has been taking no business for delivery this year or next except defense orders. This interest may open books for 1942 in a month or six weeks although no decision has yet been made. Inventories are about unchanged although unbalanced and declining in some instances. Increased demand for tubular goods is noted. Increased ship and railroad freight car tonnage is anticipated.

New orders booked with priorities at BUFFALO have increased sharply in the last few weeks to the point where more than 80 per cent of all new business accepted now bears priorities. At the same time, shipments to non-defense industries are being steadily cut down though one steel company which made an investigation through trade experts believes inventories of non-defense manufacturers are well in excess of normal inventories in good times.

Additional appropriations providing expansion of military projects on the WEST COAST indicate a demand for reinforcing and structural steel during the next six months equal or greater than that experienced during the first six months of this year. Particularly heavy demand for structural steel is now coming from the Ogden, Utah, region, and further expansion there of ordnance facilities, including the construction of a small arms plant, insure continued heavy demands. Export inquiries from the south Pacific continue to be heavy, with buyers experiencing great difficulty in getting either steel or cargo space.

New business is moving in steadily in the EASTERN PENNSYLVANIA district with bookings still well above shipments. Priority material is now taking almost all of the capacity of eastern mills, with very little steel going into civilian channels. The Pennsylvania Railroad is still trying to place orders for the steel they need to build 6500

cars in their car expansion program, but mills are so booked up that they have been unable to accept the orders.

Railroads have asked OPM for a higher priority rating than the A-3 rating assigned them recently, since they have had little success in getting the material they need.

## Sheets and Strip

*... Shipments to automobile industry taper at Cleveland*

Harassed and confused in the face of probable changes in sheet and strip distribution, PITTSBURGH flat rolled steel makers are making best interpretations possible out of the welter of Washington instructions. National defense needs are getting right of way over all other material and the automotive industry will soon feel the full impact of the government's program to utilize as much sheet mill equipment as possible for heavy gage sheets and light gage plates needed for national defense. Farm implement makers who justly consider themselves an important part of the national defense program are expected to obtain preference ratings soon. It is pointed out, however, that any treatment accorded these manufacturers should extend to parts for repair and maintenance of existing units now playing their part in producing primary foods. Mere allocation without official OPM priority ratings will be of little help to farm implement parts distributors or farmers who are in need of such parts.

Cold mill operations at CLEVELAND have slackened recently due to the concentration upon heavy hot rolled sheets and plates for the defense program. Shipments to the auto industry are lighter and tonnage going into other peace-time products also seems to have tapered recently.

Deliveries are again being set forward at CHICAGO. Sheets, strip mill sizes, are obtainable in 10 to 11 months compared with nine to 10 months previously. Strip, 2½



in. and under, can be had in six to seven months as against five to six. Wide strip is promised by some mills in 10 to 11 months as against nine to 10. Output of cars is expected to decline gradually during the last two weeks in July following the completion of 1941 models. One Chicago steel producer reduced shipments of sheets to auto makers 20 per cent the first of July.

Holiday conditions failed to ease the pressure for defense production in SOUTHERN OHIO during the past week. Currently, sheet producers indicate a steady increase of direct government orders and report Washington steadily inquiring for further materials. Normal sheet users are being constantly reduced in amount of tonnage allocable to normal usage. Effort on the part of district producers to provide non-defense consumers with allotments near the 1940 amount, are not meeting with success. Inability to get zinc and smelter is causing some curtailment in the output of galvanized sheets and one producer in the area reports that its galvanized sheet department has been forced to reduce operations because of the shortage.

July and August have been designated as a period for an "all-out" campaign of sheet production for the British. One mill has received instructions that all British requirements for sheets are to be met in these months at the expense of almost any other bookings for this commodity.

## Operations

... Steel production up five points to 98.5 per cent

Ingot production this week will recover from the Fourth of July holiday dip by rising five points from 93.5 to 98.5 per cent, but will not quite return to the pre-holiday level of 100.5 per cent. All districts regained some lost ground, but the major production centers did not come back to their pre-holiday activity. Detroit, on the other hand, reached maximum theoretical capacity of 112.5 per cent ingot production this week. Late adjustments in operations over the holidays caused a revision of last week's operating rate at Pittsburgh from 98 to 96 per cent and at Chicago from 93 to 97 per cent. These revisions

## National Tube Will Build New Furnace

Lorain, Ohio

... National Tube Co. will build a new blast furnace at its plant here under the same plan executed a few months ago whereby a stack was torn down and replaced by a complete new 1000-ton unit. The tube company, which is encountering unprecedented demand for pipe and also is shipping heavily to Cleveland plants of United States Steel Corp., will endeavor to keep the production of its five stacks intact until the last possible moment. With materials assembled at the site, the furnace to be removed will then be torn down and construction rushed on the new job.

more or less cancel one another, leaving the national rate unchanged for last week at 93.5 per cent.

## Pig Iron

... Pig shortage curtails operations at defense plants

Some Pittsburgh pig iron consumers with defense contracts are rapidly reaching the point where visible stocks are declining and no assurance as to future supplies has been obtained. In two instances plants with defense work have shut down or curtailed operations. Governmental action is expected momentarily in the form of allocation

For details of possible government control over distribution of pig iron see page 117.

or preference ratings. Jones & Laughlin Steel Corp. has blown in a blast furnace at its Eliza works following relining operations.

Middle Western pig iron markets appeared unsettled at the start of this week, reports CLEVELAND. Two moves were expected to be made by Washington which would reduce confusion and restore balance. The placing of pig iron under strict rationing control was expected momentarily. The second move which seemed likely to materialize is the granting of an alternative in quoting domestic consumers f.o.b. furnaces or delivered to foundries, the same general principle as recently granted steel sellers. There was also a possibility permission might be sought toward

temporary abandonment of several basing points where no local iron is now available.

As stated last week, the amount of absorption necessary to reach some consumption points is so great that producers burdened with higher wage, ore and coke costs are reluctant to continue shipping.

CLEVELAND also reports the tonnage for the British which the Treasury Department has been lining up is believed finally settled.

Merchant pig iron sellers at CHICAGO are taking business for delivery to Oct. 1. Priority ratings are being considered at Washington. Production is at capacity in the Central West. There has been heavy buying for the third quarter.

No change is reported in the pig iron situation in the PHILADELPHIA area, with producers continuing to ship in small lots. Indications are that a price relief will be requested shortly by some merchant producers that are faced with high operating costs due to use of beehive coke.

Government priorities have not been issued in NEW ENGLAND to date, but are expected any day now. The foundry trade in general is considerably concerned about priorities, especially those not having a great deal of defense business on their books and those having only a small percentage. The feeling persists among them the big interests will be favored with priorities at the expense of the small fellows.

On the other hand furnace representatives welcome priorities because the iron supply situation is fast becoming acute. To illustrate, Mystic Iron Works has taken care of regular customers up to now and materially helped out others who heretofore did not buy from them. The furnace is now practically down to the point where it will have to depend solely on its daily output, and this output cannot be spread very far. Priorities therefore take Mystic off the spot, so to speak.

The usual flock of rumors and desire for changes in OPACS ruling on pig iron floated about the SOUTHERN OHIO market during the past week, during the first week of operations under the recent price rulings. While some changes is indicated as desirable, because of the inability of the present prices to attract northern iron into this district, so far suppliers have been

able to keep local foundries in operation. Nevertheless, the trade generally feels that as demands from other areas grow broader, the local area is going to suffer, unless by that time some priority or other supply arrangement has been set up by Washington.

## Iron Ore

*... Lake shipments 5 million tons ahead of record*

The 28,825,921 gross tons of Lake Superior iron ore brought down the Great Lakes this season to July 1 exceed by almost 5,000,000 tons the best previous shipping record for any season up to the same date. In 1929 the amount hauled by July 1 totaled 22,239,948 tons, and in 1937 the fleet had carried 23,922,294 tons to the same date. Last year only 17,268,690 tons had been hauled by vessels up to July 1. Shipments this month are expected to be near the 11,000,000-ton mark.

## Semi-Finished Steel

*... Way out seen for non-integrated steel producers*

Non-integrated steel producers may not face the calamity that some visualized a few months ago, reports CLEVELAND. Although heavily booked for months ahead, some of these mills may be able to shrink their backlogs by 20 per cent, accept an equivalent amount of allocated British or U. S. defense tonnage and obtain necessary semi-finished from customary sources of supply with the assistance of Washington.

Available supply of semi-finished material at PITTSBURGH dictates the extent to which various non-defense steel products will be turned out in coming months. With preference ratings increasing rapidly in number, the mere existence of finishing mill capacity is no criterion on the amount of finished products which will be produced. A greater number of billets, blooms and slabs are earmarked for armament needs and week by week the amount of available semi-finished material for even essential non-defense products is declining.

## June Freight Car Orders Total 27,265

... Railroad freight cars ordered from car shops and builders during June total 27,265, compared with 23,705 in May, setting a new record for the present buying wave. In the last six months a total of 98,049 freight cars was ordered, one of the heaviest half-year periods in history. During the entire year 1940 only 65,294 cars were bought.

## Railroad Buying

*... Cars ordered for week 6115, locomotives, 15*

Three car building plants which have been shut down because of lack of plates from 1½ to 2 months have now obtained steel and are working at close to 50 per cent of capacity. These plants are: Pullman Standard Car Mfg. Co., Butler, Pa.; Ralston Steel Car Co., Columbus, Ohio, and American Car & Foundry Co., Huntington, W. Va. The fourth plant, Greenville Steel Car Co., Greenville, Pa., is expected to resume operations this week. The shutdown of these plants, it is estimated, resulted in a net loss to the railroads of from 5000 to 8000 freight cars.

In the course of the week orders were reported to the amount of 6115 freight cars and 15 locomotives, while one road was authorized to buy 20 engines.

Southern Pacific bought 4000 freight cars, allocated as follows: 50-ton box cars, 700 to Pullman Standard Car Mfg. Co., 700 to American Car & Foundry Co., and 500 to Mt. Vernon Car Mfg. Co., 700 gondolas to Bethlehem Steel Co., 150 hoppers to American Car & Foundry, 300 flat cars to Pacific Car & Foundry Co., and 250 tank cars to General American Transportation Corp.

Seaboard Airline ordered 13 diesel-electric locomotives, three of 5400 hp., two of 2000 and two of 1000 hp. from Electro-Motive Corp. and three 1000-hp. switchers each from Baldwin Locomotive Works and American Locomotive Co. This road also placed 500 box cars with Pullman Standard, 100 flat and 50 cement cars with Greenville Steel Car Co., and 100 hoppers with Bethlehem.

Other freight car orders included National Railroads of Mexico, 1000 box cars to Magor Car Corp.; New York, Chicago & St. Louis, 250 hoppers to American Car & Foundry; Florida East Coast, 30 hoppers and 30 gondolas to American Car & Foundry; Central of Georgia, 50 box cars to Pullman Standard, and the Clinchfield, five hoppers to American Car & Foundry.

The Navy placed two diesel-electric switchers with Vulcan Iron Works. St. Louis-San Francisco was authorized by Federal Court to buy five 1000-hp. diesel-electric and 15 type 4-8-4 steam engines.

Unless makers of urban and interurban passenger car equipment and manufacturers of locomotives obtain a definite preference rating, the allocation program by OPACS giving them preference over all other civilian needs will probably be of little practical value. Orders with definite preference ratings are so great in number that only a portion of civilian requirements are expected to be met in coming months.

## Wire Products

*... Relief awaits drop in automobile demand*

With tonnage for the defense program increasing, wire markets unquestionably are tighter and will remain so until the cutback on automobile production provides relief, either directly or through an easing of the unprecedented demand from industries like the bolt and nut field.

Last week at CLEVELAND inquiries for stapling wire, broom wire and various types of special finish wires reached a new peak, considering the season. This was partly due to the extended strike at Fostoria. CLEVELAND also reports that wire rope orders in popular sizes up to and including 7/8 in., in preformed and other grades, have been growing rapidly recently. There are still some fair size consigned stocks in existence. Galvanized items continue in particularly heavy demand in comparison to current production.

To reduce handling, cut manufacturing problems, and simplify



jobber stocks, makers of field fence have reduced the number of available gages. Where heretofore various gages could be obtained, field fence is now being standardized to 9 gage and 11, 12½ and 14½ gage filler. Field fence may now be obtained in rolls of 20 rod only, it formerly having been available in 10, 20, 30, and 40 rod lengths. Except for gages 17 and 18, which are available in 150 ft. rolls, poultry fence may only be obtained in 10 rod rolls instead of 10 and 20. It is expected that these changes will be permanent.

## Shipbuilding

... Navy asks \$585 millions for additional shipyard program

Congress was asked by the Navy Department on Monday for a \$585,000,000 appropriation for additional shipbuilding repair and ordnance facilities to be built at naval yards and private establishments.

## Tin Plate

... Cold mills continue to run above 100%

Cold reduction tin plate mills continue to operate at above 100 per cent of capacity, with the national defense needs growing more important.

## Plates

... Closed car plants get steel, work at half capacity

Railroads and shipbuilding companies will require large tonnages in the next few months. Specifications on steel for shipbuilding placed some time ago are now being released to CHICAGO mills.

Manufacturers in the St. Louis district of tanks and steel drums for the oil trade have been accumulating evidence with which to obtain priorities by sending orders to mills, which have been promptly sending them back as rejected.

## Tubular Goods

... OPACS order puts boiler tube schedules ahead

The heavy influx of oil-country goods specifications continues at

## Empire Sheet Co. To Make Steel For Ford

Cleveland

... Empire Sheet & Tin Plate Co., Mansfield, Ohio, is reported to have set aside four of its six open hearths for steel for Ford Motor Co., which seemingly explains Ford's shipments of bundles to Central Ohio recently. Ford operating executives are at Mansfield. Officials of Empire could not be reached for comment Tuesday. At the same time Ford is reported to have ceased shipping scrap, temporarily at least, to several dealers in Northern Ohio who are given the alternative of canceling their orders or awaiting delayed shipment. Ford has been buying scrap freely at Detroit recently.

PITTSBURGH but pipe makers point out that delivery of this tonnage depends entirely upon prompt completion of material carrying national defense preference ratings. The OPACS order giving locomotives first call over all other civilian needs means that boiler tube schedules shall take care of this industry before other civilian requirements but after national defense needs.

Heavy demand in small lots persists at YOUNGSTOWN and CLEVELAND. Casing mills, both electric weld and seamless, have added extensively to their order backlogs during the past month. On the line pipe side, several small initial tonnages have been received for lines which eventually will command much more steel. The starting mileage apparently was placed with the intention of getting the project onto producers' books, even though right-of-way acquisitions and other preliminaries had not been completed fully.

Demand for tubular goods has increased materially at CHICAGO. Sales of pipe, particularly from warehouse stocks, are at a high rate. July shipments to date are heavy.

## Merchant Bars

... Three-fourths of output at Pittsburgh covered by priorities

Close to 75 per cent of current bar production at PITTSBURGH has

some form of priority rating. So many preferences have been given that mills are at a loss many times to know which one to get out first.

The number of alloy orders at CHICAGO declined in the last week although the tonnage involved was about the same as in the preceding similar period. Bar orders are mostly for defense with some for automotive makers. Farm equipment companies are reported feeling an acute shortage and some of them are endeavoring to be placed on the priority list. Action of this kind is reported to have been taken by the James Mfg. Co., Ft. Atkinson, Wis.

## Reinforcing Steel

... New projects drop to 7905 tons from 20,920 tons last week

Reinforcing steel awards total 6135 tons. Largest lettings are 1100 tons for an arsenal wharf at Benicia, Cal., and 1000 tons for an addition to the Revere Brass & Copper plant, Chicago. New reinforcing steel projects declined to 7905 tons from 20,920 tons last week. The only new inquiries reported are 1250 tons for a flood wall at Cincinnati, and 1235 tons for road work in Wayne County, Mich.

## Structural Steel

... Awards decline slightly to 32,000 tons

Fabricated structural steel awards of 32,000 tons are slightly lower than last week. Sizable lettings include 7200 tons at Long Island City, N. Y., for the Sperry Gyroscope plant; 4700 tons for a state bridge at Peoria, Ill.; 3260 tons at Charlotte, N. C., for an army Q.M.C. depot; 3100 tons at Lakehurst, N. J., for two hangars; 2000 tons for an addition to the Brooklyn Navy Yard power plant; 1880 tons at Texas City, Tex., for a plant for the Tin Processing Corp.; 1100 tons for the Kingsbury Ordnance Plant, Kingsbury, Ind., and 1100 tons for 14 warehouses at McClellan Field, Cal.

New structural steel projects total 15,700 tons. The largest new jobs reported are 4000 tons at West Lynn, Mass., for a plant for the General Electric Co.

# Machine Tools

... SALES, INQUIRIES AND MARKET NEWS

## Small Machine Shops Formed

Cleveland

••• In this district all signs point to fast recovery from the lull brought on by the holiday and vacations. Inquiries for equipment for the new propeller plant at Toledo are out. Principal equipment for the new \$16,000,000 Chase Brass plant here has been bought. Planer sales have been heavy and more will be required by a big machine tool firm here.

Small new machine shops have been coming into existence all over the state recently. Several have started recently in this city, and new ones are found in Marion, Painesville, Toledo and Akron. Gougler at Kent and Columbus Auto Parts at Columbus have added to their machining facilities. Black & Decker at Kent received a new

educational order for 20 mm. shells. At Van Wert and Delphos small shops are very busy.

Three more companies here have undertaken to make a small cartridge press in addition to Kilby Mfg. Co., and over the nation more than 90 subcontracts have been placed by one large press builder who holds a record volume of business chiefly in connection with the bomber and cartridge case programs.

## No Holiday Lull Noted

Cincinnati

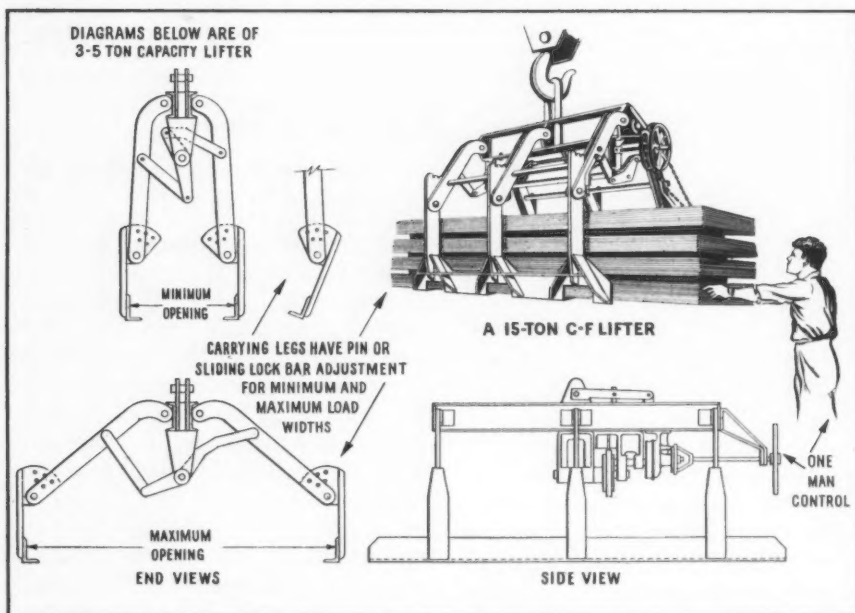
••• No change of the machine tool output because of the holiday was noted in this area. While there were some small deviations from the established pattern of maintaining operations at the high rate,

it is not expected that this will effect the general averages appreciably.

Some small delays have been experienced in getting material for new building programs that are under way. As a matter of fact, one large company, with a large expansion program, was delayed in getting its new shop under way because of difficulty of obtaining steel, and is now having difficulty in getting its office building under way because of failure of suppliers to obtain steel for that project.

New business is following a steady but "chunky" pattern and while the average is still very high, the inflow of orders is coming in in jerks. A substantial amount of business is still reported in the offing, as there is much Government business yet to be placed.

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## Lull in Buying in the East

New York

••• Local dealers and direct sales representatives report a distinct let-up in buying activity in the past few weeks. June sales in general were below those of May, although the total volume still remains well above normal. Several new programs are in prospect, however, involving purchases of large quantities of new machinery. A subcontractor of Sperry Corp. has placed large orders and the parent company is expected to follow suit within the next few weeks. Quotations have been out on tools for the Ford Instrument Co. for some time and early action is looked for here also. In fact, buying activity on the part of the instrument makers is the first sign of machine tool demand in line with the 500 bomber a month program. Wright Aeronautical Corp.'s part in the program is still a mystery to sellers here. To some extent the decision to buy additional equipment hinges on the choice of a site for a new plant.



# Non-Ferrous Metals

## ... MARKET ACTIVITIES AND PRICE TRENDS

••• In a telegram to a Michigan copper producer, Leon Henderson, OPACS Administrator indicates that consideration is being given to the possibility of prices above 12c. a lb., for high cost producers to maintain current production and for any increment over present production by producers in order to stimulate output. However, a final decision has not yet been reached on this matter by the government.

Meanwhile, the red metal industry is awaiting official confirmation of the OPM verbal order that 20 per cent of the July refined production would be set aside for the pool before disposition is made of July copper shipments to defense and other consumers. The 20 per cent pool, the same proportion as the June pool, will furnish between 17,000 and 18,000 tons of copper, which will be augmented by imports from South America by the Metals Reserve Corp.

### Copper

Prices held unchanged over the past week at 12c. a lb., delivered Connecticut Valley base for principal primary producers, and custom smelters and smaller producers selling at 12.50c. Sales of copper over the holiday week-end totaled 8653 tons, bringing the monthly sales to date to 18,946 tons, as compared with 12,768 tons in the like June period.

### Zinc

Due to the holiday, zinc ore production fell to 8350 tons during the past week from 9060 tons for the week previous, while shipments jumped to 10,087 tons from 8957 tons the previous week. The slab zinc situation is as tight as ever, with non-defense users finding it increasingly difficult to obtain adequate supplies. Zinc stocks in consumers' hands dropped from 59,414 tons on April 20 to 56,489 tons on May 31, the decrease being almost entirely at the expense of the galvanizing industry, whose stocks fell from 29,665 tons to 26,025 tons during the same period. Zinc prices remained unchanged at 7.25c., East

St. Louis, and 6.65c., a lb., at New York.

### Lead

Reports of negotiations by the government for substantial tonnages of Mexican, Canadian and Peruvian lead are still waiting to be confirmed. Alleviation of the steadily tightening lead supply situation is said to depend greatly upon such a move, since only 50,000 to 55,000 tons of the estimated 77,000 tons shipped in June were derived from domestic sources. This week's market was much the same as in recent weeks, with consumers requesting considerably more lead than producers were able to furnish. Prices are holding unchanged at 5.70c., at St. Louis, and 5.85c., at New York.

### Tin

The tin market last week reflected the usual holiday quiet, with prices showing little variation until Tuesday when a slight flurry edged prices over the 53c. level. Reports persisted late in the week that Britain was planning to supply Russian with tin from Singapore.

#### June Average Prices

Average prices of the major non-ferrous metals in June, based on quotations appearing in THE IRON AGE, were as follows:

	Cents per Lb.
Electro copper, Conn. Valley....	12.00
Lake copper, East. delivery....	12.00
Straits tin, spot, New York.....	52.681
Zinc, East St. Louis.....	7.25
Zinc, New York.....	7.65
Lead, St. Louis.....	5.70
Lead, New York.....	5.85

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TO  
DEFENSE  
THAT**



## Conserves Steel!

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★Then a hard coating of Coast Metals was applied, and the bucket lip went back into service in better condition to resist abrasion than when new.

★Here is a saving in dollars for steel companies, and a saving in steel for defense.

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# Scrap

## ... MARKET ACTIVITIES AND QUOTATION TRENDS

••• With the scrap supply situation still in a very precarious position, a new element of uncertainty has been injected into the market in the form of resumption of fairly large exports to Great Britain under the Lend-Lease Act. Efforts to accommodate a tentative export schedule of about 60,000 tons this month has given rise to a price situation in the New York area, the chief exporting area, which may force an immediate answer to the question of whether it is more important to keep British steel plants going than to maintain domestic mill operations.

In an effort to fill part of an order for Great Britain, market information is to the effect that an exporter in New York has bought at a price slightly above the domestic ceiling for that area. Dealers buying for domestic shipment, faced with the urgent demands of domestic consumers, apparently have been forced to meet this higher level in order to obtain material for shipment to Eastern Pennsylvania mills, thus resulting in moving the market for No. 1 and No. 2 steel there up about 50c. Adding to the New York export problem, is the growing complaint from Buffalo mills over the large tonnages moving to Canada.

The general attitude among mills and dealers is that there is need for the establishment of a set policy with respect to scrap exports. Mills on one hand are faced with pressure from the OPM, the Army and Navy for quick shipment of defense steel, while on the other hand they are confronted with the possibility of being forced to curtail operations due to inability to obtain adequate scrap supplies. While the tonnage involved in exports is not exceptionally large in comparison to present ingot production, it does loom important in view of the current tightness when few mills have anything approaching normal working stocks.

Meanwhile the domestic supply situation is growing increasingly severe, with predictions coming from the Central states that unless an immediate improvement is effected,

curtailment will be forced within the next 30 to 45 days. The situation in the East is still more critical. THE IRON AGE composite this week is unchanged at \$19.17.

A strict interpretation of the OPACS iron and steel scrap schedule as amended June 18, 1941, indicates that the maximum price of scrap originating and delivered within a basing point area is the ceiling price listed in Appendix A of the price schedule, plus the switching charge. Such an interpretation, however, would be contrary to general past practice as all brokers and consumers have figured that the maximum price of scrap originating and delivered within a basing point area was only equal to the ceiling prices listed in Appendix A.

Because of the confusion which might surround such a strict interpretation and because of difference of opinion within OPACS, it is learned that the legal department of OPACS has withdrawn its interpretation that the switching charge may be added to the ceiling price. It has been informally recommended that the former practice be carried on until clarification is forthcoming. Such clarification, however, will necessitate a change in the recent amended order.

### Pittsburgh

Little or no change from conditions a week ago is apparent here. Scrap is still hard to obtain and available supplies are not meeting requirements of melters.

### Chicago

Shipments slowed down perceptibly in the last 10 days, due partly to the Fourth of July holiday, but is expected to continue as dealers yards have virtually no stocks. Steel mills have not complained that the flow of scrap is insufficient up to this time.

### Philadelphia

The scrap situation in this area is becoming continually more acute, with mills finding it daily harder to obtain necessary scrap and the small supplies they have on hand are quickly diminishing. Overgrading of scrap is prevalent. Some mills are accepting substantial percentages of galvanized and other coated metal in No. 2 dealers' bundles.

### Cleveland

Foundries here have resorted to using inferior grades of scrap in order to keep

on melting and even steel mills are not averse to accepting light materials. With plant production irregularly lowered due to vacations, and with automotive production scheduled to taper, the outlook over the balance of this summer is not encouraging. Dealers report that their railroad and country scrap receipts are lower also.

### Youngstown

The district here continues having serious troubles getting scrap and is probably in the most precarious position of any major area. Slackening of steel operations within 30 days is now predicted unless more material can be obtained. Shipments during the past week were away below expectations. Light grades and materials which would never pass inspection previously are being accepted through necessity.

### Detroit

With sharply decreased production of scrap occurring this month as auto plants and suppliers slow down for the model change-over period, all the available scrap was reported going into consumption. Very little is being shipped out of Detroit. Foundry scrap grades which have been moving to such points as Cleveland are now all going into consumption locally, with some being used in open hearth furnaces, it is reported.

### New York

Considerable confusion prevails in the market here, with No. 1 melting steel reported being sought by dealers at about \$16, or slightly more than 50c. above the official ceiling price for this area. The situation is reported to have developed when an exporter, covering on an order for Great Britain recently placed by the Treasury Department, began buying at a price slightly above the domestic ceiling. Dealers buying for domestic shipment were forced to meet this price in order to keep material moving to Eastern Pennsylvania mills. The higher prices are said to prevail in Brooklyn and nearby Jersey points, but at the time of going to press it had apparently not yet spread to other shipping point areas. In view of the tightness in scrap supplies, considerable concern is felt over the possible repercussions to the domestic market of efforts to maintain a tentative export schedule of 60,000 tons this month to England.

### Toronto

While scrap is appearing in better volume, demand is still well in excess of supply. Large imports of steel scrap are pouring into the Hamilton mills from United States, while local consumers have also been obtaining cast scrap from across the line. Imports, however, are well under the right record of last year. Foundry interests are making special efforts to pick up machinery cast and stove plate and purchases of cast have been made in excess of \$27 per ton delivered.



## June Pig Iron Output at 95.9 Per Cent of Capacity

••• Production of coke pig iron in June totaled 4,553,165 net tons compared with 4,599,966 tons in May. Output on a daily basis last month showed a gain of 2.3 per cent over that in May, or from 148,386 tons to 151,772 tons a day in June. The operating rate for the industry was 95.9 per cent of capacity in June, compared with 93.8 per cent in May.

Production for the first six months this year was 27,053,100 net tons, against 21,083,600 tons in the comparable period last year. The daily rate averaged 149,465 net tons, a gain of 29 per cent over the 115,844 tons in the same period last year.

### Gain in Daily Output of 2.3% Increase for First Six Months of 29% Over Last Year

There were 211 furnaces in blast on July 1, five more than the 206 in blast on June 1. The furnaces in operation on July 1 were producing at the rate of 153,600 tons a day, compared with a production rate on June 1 of 151,000 tons. United States Steel Corp.

blew in one furnace and took one off blast, independent producers put four in blast, and one merchant furnace was blown in.

Among the furnaces blown in were the following: One Clairton, Carnegie-Illinois Steel Corp.; one Cambria, Bethlehem Steel Co.; one Haselton, Republic Steel Corp.; one Swede, Alan Wood Steel Co.; one Campbell, Youngstown Sheet & Tube Co., and one Shenango, Shenango Furnace Co.

The only furnace blown out or banked was an Ensley unit of Tennessee Coal, Iron & Railroad Co.

#### Production of Coke Pig Iron and Ferromanganese

	Pig Iron*		Ferro-Mn†	
	1941	1940	1941	1940
January	4,663,695	4,032,022	35,337	43,240
February	4,197,872	3,311,480	33,627	38,720
March	4,704,135	3,270,499	55,460	46,260
April	4,334,267	3,137,019	56,871	43,384
May	4,599,966	3,513,683	58,578	44,973
June	4,553,165	3,818,897	53,854	44,631
½ year	27,053,100	21,083,600	293,727	261,208
July	4,053,945	4,053,945	43,341	43,341
August	4,238,041	4,238,041	37,003	37,003
September	4,176,527	4,176,527	33,024	33,024
October	4,445,961	4,445,961	32,270	32,270
November	4,403,230	4,403,230	31,155	31,155
December	4,547,602	4,547,602	35,666	35,666
Year	46,948,906	46,948,906	473,667	473,667

\*These totals do not include charcoal pig iron. †Included in pig iron figures.

#### Daily Average Production of Coke Pig Iron

	Per Cent Capacity		Per Cent Capacity	
	1941	1940	1941	1940
January	150,441	95.5*	130,061	85.8
February	149,924	95.2	114,189	75.1
March	151,745	96.9	105,500	68.9
April	144,475†	91.8†	104,567	68.6
May	148,386	93.8	113,345	74.8
June	151,772	95.9	127,297	83.9
½ year	149,465	94.5	115,844	76.1
July	151,772	95.9	130,772	86.3
August	136,711	90.4	136,711	90.4
September	139,218	92.2	139,218	92.2
October	143,418	94.8	143,418	94.8
November	146,774	97.1	146,774	97.1
December	146,697	97.2	146,697	97.2
Year	128,276	84.6	128,276	84.6

\*Revised for capacity as of Dec. 31, 1940. †Revised.

#### Merchant Iron Made, Daily Rate

	1941	1940	1939
January	20,812	16,475	11,875
February	21,254	14,773	10,793
March	23,069	11,760	10,025
April	20,434	13,656	9,529
May	21,235	16,521	7,883
June	21,933	13,662	8,527
July	16,619	9,404	
August	17,395	11,225	
September	17,571	12,648	
October	18,694	16,409	
November	22,792	16,642	
December	19,779	16,912	

#### Production by Districts and Coke Furnaces in Blast (In Net Tons)

					July 1, 1941		June 1, 1941		
	June, 1941	Daily % of Capacity	May, 1941	Daily % of Capacity	June, 1940	No. in Blast	Operating Rate	No. in Blast	Operating Rate
Eastern .....	30,996	87.4	32,056	87.7	.....	2	1,030	2	1,035
Buffalo .....	286,296	97.3	265,702	87.3	244,133	14	9,545	14	9,055
Philadelphia .....	385,876	86.2	389,505	84.2	365,128	17	13,015	16	12,565
Ferro. and Spiegel .....	17,247	108.4	17,653	107.3	11,094	4	575	4	570
Pittsburgh .....	1,086,605	94.3	1,087,289	91.3	948,885	47	36,995	45	35,890
Ferro. and Spiegel .....	34,697	82.6	35,597	82.1	26,048	4	1,155	4	1,150
South Ohio River .....	98,130	93.1	98,777	90.6	90,904	7	3,270	7	3,185
Valleys .....	567,817	100.5	516,134	88.4	453,476	25	19,825	22	17,300
Wheeling .....	208,126	104.7	218,434	106.4	158,428	9	6,940	9	7,045
Cleveland .....	405,298	102.6	413,427	101.3	293,510	17	13,510	17	14,105
Chicago .....	999,555	97.5	1,022,746	96.6	800,108	39	33,320	39	33,455
St. Louis .....	.....	.....	.....	.....	.....	0	.....	0	.....
Detroit .....	84,705	75.4	118,955	102.4	104,135	4	2,825	4	3,035
Western .....	52,974	87.1	67,703	107.6	53,650	4	1,765	4	2,185
Ferromanganese .....	.....	.....	.....	.....	3,577	0	.....	0	.....
Southern .....	292,933	101.6	310,660	104.3	254,985	17	9,765	17	10,370
Ferromanganese .....	1,910	21.8	5,328	57.3	10,836	1	65	2	55
Total .....	4,553,165	...	4,599,966	93.8	3,818,897	211	153,600	206	151,000

\*Revised.

#### "Urgency Standings" Govern Machine Tool Shipments

Washington

••• A new plan to regulate the distribution of machine tools, in-

cluding the establishment of master preference list of defense contractors, was made public on Tuesday by OPM's Priorities Division. Major objective of the plan is to permit a selection between orders carrying the same

priority ratings and on which deliveries conflict. This is expected to be accomplished through "urgency standings" which are set forth for various defense contractors under the terms of the order.

# Construction Steel

...STRUCTURAL STEEL, REINFORCING BARS, PLATES, PILING, ETC.

## Fabricated Steel

Lettings slightly lower at 32,000 tons; new projects call for 15,700 tons; plate awards total 4865.

### AWARDS

#### NORTH ATLANTIC STATES

- 7200 Tons, Long Island City, N. Y., Sperry Gyroscope building for Defense Plant Corp., to American Bridge Co., Pittsburgh.
- 3100 Tons, Lakehurst, N. J., two rigid frame hangars, to Bethlehem Steel Co., Bethlehem, Pa.
- 2000 Tons, Brooklyn Navy Yard, power plant addition, to an unnamed fabricator.
- 725 Tons, Philadelphia, two storehouses at Frankford Arsenal, to Bethlehem Steel Co., Bethlehem, Pa.
- 415 Tons, Dansville, N. Y., Delaware, Lackawanna & Western Railroad State grade elimination, to American Bridge Co., Pittsburgh.
- 400 Tons, Livingston County, N. Y., State bridge, to American Bridge Co., Pittsburgh.
- 298 Tons, Brooklyn, buildings for Thames Corp., to an unnamed bidder.
- 275 Tons, Niagara Falls, N. Y., building No. 16, for E. I. du Pont de Nemours & Co., to Bethlehem Steel Co., Buffalo.
- 250 Tons, Dorchester, Mass., Bird St. bridge, to Phoenix Bridge Co., Phoenixville, Pa., through Coleman Brothers Corp., Boston, contractor.
- 200 Tons, Quonset Point, R. I., magazines, project 36, to Belmont Iron Works, Philadelphia.
- 200 Tons, Buffalo, building for Acme Steel & Malleable Iron Works, to R. S. McManus Steel Construction Co., Inc., Buffalo.
- 200 Tons, Jefferson County, N. Y., highway bridge, to Bethlehem Steel Co., Buffalo, through Bero Engineering Corp., Buffalo.
- 150 Tons, Hempstead, N. Y., Long Island Railroad State bridge, to American Bridge Co., Pittsburgh.
- 150 Tons, Northbridge, Mass., State bridge, to Bethlehem Steel Co., Bethlehem, Pa.
- 150 Tons, Niagara Falls, N. Y., buildings for National Carbon Co., to Bethlehem Steel Co., Bethlehem, Pa.
- 100 Tons, West Hartford, Conn., Andrews Corp. professional building, to Standard Structural Steel Co., Hartford, Conn.

#### THE SOUTH

- 3160 Tons, Charlotte, N. C., Army Q.M.C. depot; 2110 tons to Bethlehem Steel Co., Bethlehem, Pa.; 1050 tons to Ingalls Iron Works Co., Birmingham.
- 1880 Tons, Texas City, Tex., Tin Processing Corp. plant, to Mosher Steel Co., Dallas, Tex.
- 473 Tons, Lawrence County, Ark., bridge, to Vincennes Bridge Co., Vincennes, Ind.

- 300 Tons, Victoria, Tex., three demount hangars, to an unnamed bidder.
- 235 Tons, Clarksburg, W. Va., buildings for National Carbon Co., to Bethlehem Steel Co., Bethlehem, Pa.

#### CENTRAL STATES

- 4700 Tons, Peoria, Ill., State bridge, route FA 172, section 15, E and F, to American Bridge Co., Pittsburgh.
- 1100 Tons, Kingsbury, Ind., one additional 37-MM line for ordnance plant, to American Bridge Co., Pittsburgh.
- 618 Tons, Cherokee County, Kan., bridge, to Kansas City Structural Steel Co., Kansas City.
- 441 Tons, Shawnee County, Kan., bridge, to St. Joseph Structural Steel Co., St. Joseph, Mo.
- 155 Tons, Akron, Ohio, preparation building for Defense Plant Corp., to American Bridge Co., Pittsburgh.
- 120 Tons, Chicago, crane runway for Chicago Bridge & Iron Co., to American Bridge Co., Pittsburgh.

#### WESTERN STATES

- 1100 Tons, McClellan Field, Cal., 14 warehouses, to Herrick Iron Works, Oakland, Cal.
- 468 Tons, Victor, Cal., four demount hangars, to Pacific Iron & Steel Co., Los Angeles.
- 351 Tons, Mesa, Ariz., three demount hangars, to Allison Iron Works, Phoenix, Ariz.
- 254 Tons, Shell Point, Cal., compressor building for Shell Chemical Co., to Judson-Pacific Co., San Francisco.
- 165 Tons, Eureka, Cal., Eureka slough bridge for State, to American Bridge Co., Pittsburgh.
- 108 Tons, Provo, Utah, State highway bridge, to Provo Foundry & Machine Co., Provo, through J. M. Sumsion, Springville, Utah, contractor.

#### HAWAII

- 550 Tons, Honolulu, Hawaiian Pineapple Co. plant, to Bethlehem Steel Co., San Francisco.

### PENDING STRUCTURAL STEEL PROJECTS

#### NORTH ATLANTIC STATES

- 4000 Tons, West Lynn, Mass., plant extension for General Electric Co.
- 750 Tons, Anacostia, D. C., land plane hangar for Navy.
- 350 Tons, Paterson, N. J., Delaware, Lackawanna & Western Railroad State grade elimination.
- 300 Tons, Buffalo, addition for Standard Milling Co.
- 200 Tons, Niagara Falls, N. Y., addition for Republic Carbon Co.
- 175 Tons, Ithaca, N. Y., Cornell University ROTC riding hall.
- 140 Tons, Skowhegan, Me., State bridge.
- 125 Tons, Buffalo, pattern shop for Worthington Pump & Machinery Corp.

#### THE SOUTH

- 3000 Tons, Lexington, Ky., Army Signal Corps buildings.

#### CENTRAL STATES

- 700 Tons, Wichita, Kan., warehouse for Defense Plant Corp.
- 600 Tons, Cincinnati, flood wall; bids by U. S. Engineers.
- 400 Tons, Lowellville, Ohio, Mahoning River County bridge.
- 120 Tons, Chicago, bridge repairs over 43rd Street for New York Central Railroad.

#### WESTERN STATES

- 1700 Tons, Ogden, Utah, 37 mm. shell loading plant at Ogden Ordnance Depot; Peter Kiewit & Sons, Omaha, Neb., and associates, contractors.
- 1500 Tons, Ogden, Utah, two standard warehouses at Utah General Depot.
- 1000 Tons, Sacramento, Cal., engine test building at McClellan Field (Invitation 311); Ford J. Twatts, Los Angeles, contractor.
- 300 Tons, San Francisco, H-piling for quay wall at Hunters Point Naval dry dock, (Specification 10,376); Healy Tibbitts Construction Co., San Francisco, low bidder on general contract.
- 125 Tons, Fallbrook, Cal., Navy ammunitions depot; J. E. Haddock & Myers Brothers, Los Angeles, contractors.

#### HAWAII

- 141 Tons, Fort Shafter repair and maintenance shop (Invitation 51); Pacific Construction Co., Honolulu, low bidder on general contract.

### FABRICATED PLATES

#### AWARDS

- 2359 Tons, Pittsburgh, seven tanks for U. S. Engineers' office, to Pittsburgh-Des Moines Steel Co., Pittsburgh and Hammond Iron Works, Warren, Pa.
- 1360 Tons, Pittsburgh, Pa., four tanks for U. S. Engineers' office, to Bethlehem Steel Co., Bethlehem, Pa.
- 495 Tons, River Rouge, Mich., steel pipe for Ford Motor Co., to Bethlehem Steel Co., Bethlehem, Pa.
- 350 Tons, Oleum, Cal., oil storage tanks, to Steel Tank & Pipe Co., Berkeley, Cal.
- 300 Tons, Arizona, water tank, to an unnamed bidder.

#### PENDING PROJECTS

- 600 Tons, Honolulu, pipe line; Tanner Construction Co., contractor.

### SHEET PILINGS

#### PENDING PROJECTS

- 1700 Tons, San Francisco, quay wall at Hunters Point Naval dry dock (Specification 376); Healy Tibbitts Construction Co., San Francisco, low bidder.

## Weekly Bookings of Construction Steel

Week Ended →	July 8, 1941	July 1, 1941	June 10, 1941	July 9, 1940	Year to Date	
					1941	1940
Fabricated structural steel awards	32,000	34,000	22,500	14,500	818,910	395,830
Fabricated plate awards.....	4,865	4,520	975	8,875	85,015	76,220
Steel sheet piling awards.....	0	990	200	200	17,945	21,415
Reinforcing bar awards.....	6,135	10,425	9,100	8,260	333,295	225,460
Total Letting of Construction Steel	43,000	49,935	32,775	31,835	1,255,165	718,925



## Reinforcing Steel

Awards of 6,135 tons; 7,905 tons in new projects.

### AWARDS

#### ATLANTIC STATES

- 250 Tons, Chester, Pa., Sun Shipbuilding & Drydock Co., to Bethlehem Steel Co., Bethlehem, Pa.; Raymond Concrete Pile Co., contractor.
- 200 Tons, Dorchester, Mass., Bird Street bridge, to Northern Steel Co., Boston, through Coleman Brothers Corp., Boston, contractor.
- 200 Tons, Providence, R. I., telephone building additions and alterations, to Truscon Steel Co., Boston, through E. Turgeon, Providence, contractor.
- 154 Tons, St. Johnsbury, Vt., viaduct, to Truscon Steel Co., Boston.
- 150 Tons, Boston, Navy Yard buildings Nos. 21 and 22, to Concrete Steel Co., Boston, through Sawyer Construction Co., Boston, contractor.
- 100 Tons, Washington, Central Library, first unit, to Bethlehem Steel Co., Bethlehem, Pa., through Ross Engineering Co.

#### SOUTH AND CENTRAL

- 1000 Tons, Chicago, Revere Brass & Copper addition, to Joseph T. Ryerson & Son, Inc., Chicago, through James Stewart, contractor.
- 400 Tons, Chicago, A. & P. warehouse, to Joseph T. Ryerson & Son, Inc., Chicago, Pirot Construction Co., contractor.
- 355 Tons, Waveland, Ark., Blue Mountain dam, to Sheffield Steel Corp., Kansas City, Mo., through Myers, Myers & Gowen, contractors.
- 312 Tons, Dallas County, Tex., State highway work, to North Texas Iron & Steel Co., Fort Worth, Tex.
- 300 Tons, Portsmouth, Va., Navy ammunition depot, to Truscon Steel Co., Youngstown, through R. R. Richardson & Associates.
- 165 Tons, Charleston, S. C., Navy ammunition depot, to Truscon Steel Co., Youngstown, through C. M. Guest & Sons.
- 120 Tons, Peru, Ill., St. Bede's Academy, to Bethlehem Steel Corp., through Willis Construction Co., contractor.
- 114 Tons, Rice, Kan., FA-331-A (2) to Sheffield Steel Corp., Kansas City, Mo.
- 114 Tons, Fort Sheridan, Ill., bridge project, to Joseph T. Ryerson & Son, Inc., Chicago.

#### WESTERN STATES

- 1100 Tons, Benicia, Cal., arsenal wharf (Invitation 203), to Soule Steel Co., San Francisco, through Robert E. McKee, Glendale, Cal., contractor.
- 800 Tons, Fallbrook, Cal., Navy ammunition depot, to Blue Diamond Corp., Los Angeles, through J. E. Haddock & Myers Brothers, Los Angeles, contractors.

#### BRITISH WEST INDIES

- 300 Tons, Port of Spain, Trinidad, dock and warehouse, to Jones & Laughlin Steel Corp., Pittsburgh; Walsh Construction Co., New York, and George F. Driscoll, Brooklyn, contractors.

### PENDING REINFORCING BAR PROJECTS

#### ATLANTIC STATES

- 450 Tons, Buffalo, addition for Standard Milling Co.
- 400 Tons, New York, Lincoln Tunnel, contract 55, George J. Atwell, contractor.
- 400 Tons, Philadelphia, substructure, Navy Yard storehouse; Golder Construction Co., low bidder.
- 340 Tons, Lakehurst, N. J., Naval base station facilities; Karno-Smith & Co., contractor.
- 100 Tons, Beckett, Mass., State bridge; Graves & Hemmes, Inc., Great Barrington, contractor.

#### SOUTH AND CENTRAL

- 1250 Tons, Cincinnati, flood wall bids by U. S. Engineer, Cincinnati.
- 1235 Tons, Wayne County, Mich., County Board of Road Commissioners; bids taken.

- 600 Tons, Newport News, Va., Newport News Shipbuilding & Drydock Co., pier; McLean Contracting Co., contractor.
- 250 Tons, Kenosha, Wis., American Brass Co., Austin Co., contractor.

#### WESTERN STATES

- 920 Tons, San Diego, Cal., pier and quay wall at Navy fuel depot (Specification 10,503); M. H. Golden, San Diego, low bidder on general contract.
- 800 Tons, San Diego, Cal., Navy recommissioning pier at destroyer base (Specification 10,459); Shannahan Bros., Huntington Park, low bidders on general contract.
- 200 Tons, Ogden, Utah, 37 mm. shell loading plant at Ogden Ordnance depot; Peter Kiewit & Sons, Omaha, Neb., and associates, contractors.
- 118 Tons, Los Angeles, Figueroa Street bridge over Amador Street and Solano Avenue; bids July 24.
- 100 Tons, Ogden, Utah, shell loading platform at Ogden Ordnance Depot; Bertson Construction Co., contractor.

#### PUERTO RICO

- 740 Tons, San Juan, Army base warehouses and bridges; Paul Smith Construction Co., contractor.

## Pipe Lines

Skelly Oil Co., Tulsa, Okla., plans extension mission from main system in Barton County, in welded steel pipe line for crude oil transmission from main system in Barton County, Kan., to point in Russell County, Kan., about 33 miles. Project will include booster pumping station and other operating facilities.

Texas Co., 730 San Jacinto Street, Houston, Tex., and Philtower Building, Tulsa, Okla., plans new 6-in. welded steel pipe line from oil field near Apache, Okla., to Oklahoma City, close to 65 miles, for crude oil transmission to bulk terminal at latter place. Cost over \$200,000 with booster pumping stations and other operating facilities. Work will be carried out by Texas Pipe Line Co., an affiliated interest, first noted address.

United States Engineer Office, First and Douglas Streets, N.W., Washington, asks bids until July 17 for pipe lines for South filtered water reservoir, McMillan filtration plant, Washington, consisting of 1221 ft. of 80-in. steel pipe, including fittings, etc., with alternate bids on 78-in. concrete pipe (Serial 230).

Portland Pipe Line Co., Portland, Me., has been organized as a subsidiary of Standard Oil Co. of New Jersey, Inc., 26 Broadway, New York, to build new 12-in. welded steel pipe line from Portland to Montreal, recently noted in these columns, with territory extending from Portland to point on Canadian border. Montreal Pipe Line Co., Ltd., has been formed as another subsidiary of Standard Oil Co. and its affiliate, Imperial Oils, Ltd., Montreal, to carry out project from border point to Montreal, with terminus at oil refinery of Imperial company. Line will be about 250 miles long and used for crude oil transmission. It is scheduled for completion in October. Cost over \$7,500,000.

Construction Quartermaster, Jeffersonville, Ind., has let contract to S. E. Dockstader, Inc., Munsey Building, Washington, for installation of pressure pipe line system for steam distribution at local depot, at \$154,500.

White Eagle Oil Division, Socony-Vacuum Oil Co., Federal Reserve Bank Building, Kansas City, Mo., plans new 10-in. welded steel pipe line from Chase, Kan., oil field to Augusta, Kan., about 23 miles, by way of Valley Center, Kan., for crude oil transmission to refinery at terminus noted. Line will replace an existing pipe line between two points mentioned.

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N. J., closes bids July 15 for 500 ft. of 1/4-in. welded steel pipe (Circular 2678).

Shell Oil Co., Inc., 1008 West Sixth Street, Los Angeles, has approved plans for new

welded steel pipe line from Ventura, Cal., oil field to Wilmington district, Los Angeles, about 87 miles, for crude oil transmission to bulk terminal at latter place for refinery service. Company has made application to construct line through city, extending along Lincoln Boulevard.

General Purchasing Officer, Panama Canal, Washington, asks bids until July 14 for steel pipe and fittings; also for four pieces of cast iron cement-lined water pipe, cast iron pipe fittings, malleable iron pipe fittings, unions, cast iron flanges, gate valves, check valves, plug valves, etc. (Schedule 5277).

## Cast Iron Pipe

Palacios, Tex., plans pipe line extensions and replacements in water system. Bond issue of \$30,000 has been voted for this and extensions in sewerage system. Julian Montgomery, Littlefield Building, Austin, Tex., is consulting engineer.

Vero Beach, Fla., Harry W. Damerow, superintendent of public works, asks bids until July 24 for 6500 ft. of 8-in. pipe and 6200 ft. of 6-in. for extensions in water system; also for new 250,000-gal. elevated tank with piping, valves, meters, etc.; 8-in. well, with screen, motor-driven turbine pump, pipe and fittings; extensions and improvements in present water-softener and filter plant; 34 hydrants, valves, etc.

Theresa, Wis., plans pipe lines for water system and other waterworks installation; also installation of sewerage system. Surveys and estimates of cost will be made by W. G. Kirchoffer, 22 North Carroll Street, Madison, Wis., consulting engineer.

Public Water District No. 4, Yakima County, Wash., care of Gerald D. Hall, Larson Building, Yakima, consulting engineer, plans about 15,300 ft. of 8-in., and 15,800 ft. of 6-in. for extensions and replacements in water system. Bond issue will be arranged. Yakima City plans 12-in. line in Lenox Avenue for main water supply, in connection with project.

Department of Public Works, Kansas City, Mo., A. C. Everham, director, plans pipe line extensions and improvements in water system in Fifteenth Street. Cost close to \$50,000.

Warsaw, Ohio, plans pipe lines for water system and other waterworks installation, including reinforced concrete reservoir with capacity of 50,000 gal., pumping station and other facilities. Cost about \$105,000. Financing has been arranged through Federal aid. Arnold, Rosch, Hartline, 116 Fair Street, New Philadelphia, Ohio, are consulting engineers.

Muroc, Cal., bombing range project, involves 116 tons of 2, 6, and 8-in. pipe. Peter L. Ferry & Sons, E. P. Ferry, and Sander & Pearson, Glendale, Cal., are contractors.

Lemoore, Cal., Army flying school will require 658 tons of 3, 4, 6, 8, 10, and 12-in. pipe. Lewis Franceschi Construction Co., San Francisco, is contractor.

Merced, Cal., Army flying school will require 540 tons of 3, 4, 6, 8, 10, and 12-in. pipe. W. W. Petley, Los Angeles, is contractor.

United States Engineer, South Pacific Division, San Francisco, has awarded 515 tons of 6-in. pipe to United States Pipe & Foundry Co., San Francisco, and 127 tons of 4-in. to Pacific States Cast Iron Pipe Co., Provo, Utah, under Invitation 261.

Seattle, Wash., Board of Public Works has taken bids on 115 tons of 12-in. pipe for Sand Point Way and 212 tons of 12-in. for North 195th Street.

Seattle, Wash., has taken bids for Avalon Way pipe line, involving 472 tons of 6, 8, and 16-in. pipe. Argentieri & Colarossi, Seattle, are low bidders.

# Prices of Finished Iron and Steel...

Steel prices on these pages are f.o.b. basing points (in cents per lb.) unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases freight absorbed to meet competition.

Basing Point ↓ Product	DELIVERED TO												Detroit	New York	Philadelphia
	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars			
<b>SHEETS</b>															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled <sup>1</sup>	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	
Long ternes <sup>2</sup>	3.80¢		3.80¢									4.55¢			
<b>STRIP</b>															
Hot rolled <sup>3</sup>	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢		
Cold rolled <sup>4</sup>	2.80¢	2.80¢		2.80¢			2.80¢		(Worcester = 3.00¢)				2.90¢		
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢								
Commodity C-R	2.95¢			2.95¢			2.95¢		(Worcester = 3.35¢)				3.05¢		
<b>TIN PLATE</b>															
Standard ookes (Per 100-lb. base box)	\$5.00	\$5.00	\$5.00						\$5.10						
<b>BLACK PLATE</b>															
29 gage <sup>5</sup>	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ ( <sup>10</sup> )			
<b>TERNES, MFG.</b>															
Special coated (Per base box)	\$4.30		\$4.30						\$4.40						
<b>BARS</b>															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			(Duluth = 2.25¢)	2.50¢	2.80¢	2.25¢	2.49¢	2.47¢	
Rail steel <sup>6</sup>	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.80¢				
Reinforcing (billet) <sup>7</sup>	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		2.50¢	2.55¢	2.25¢			
Reinforcing (rail) <sup>7</sup>	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢			
Cold finished <sup>8</sup>	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit = 2.70¢)						
<b>PLATES</b>															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	2.25¢ ( <sup>11</sup> )			(Coatesville and Claymont = 2.10¢) 2.45¢ 2.65¢		2.29¢	2.15¢
Wrought iron	3.80¢														
Floor plates	3.35¢	3.35¢								3.70¢	4.00¢		3.71¢		
Alloy	3.50¢	3.50¢							(Coatesville = 3.50¢)						
<b>SHAPES</b>															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢			(Bethlehem = 2.10¢)	2.45¢	2.75¢		2.27¢	2.215¢	
<b>SPRING STEEL C-R</b>															
0.26 to 0.50 Carbon	2.80¢			2.80¢					(Worcester = 3.00¢)						
0.51 to 0.75 Carbon	4.30¢			4.30¢					(Worcester = 4.50¢)						
0.76 to 1.00 Carbon	6.15¢			6.15¢					(Worcester = 6.35¢)						
1.01 to 1.25 Carbon	8.35¢			8.35¢					(Worcester = 8.55¢)						
<b>WIRE<sup>9</sup></b>															
Bright	2.60¢	2.60¢		2.60¢	2.60¢				(Worcester = 2.70¢)						
Galvanized	2.60¢	2.60¢		2.60¢	2.60¢				(Worcester = 2.70¢)						
Spring	3.20¢	3.20¢		3.20¢					(Worcester = 3.30¢)						
<b>PILING</b>															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			
<b>IRON BARS</b>															
Common		2.25¢							(Terre Haute, Ind. = 2.15¢)						
Wrought single refined	4.40¢														
Wrought double refined	5.40¢														

<sup>1</sup> Mill run sheets are 10c. per 100 lb. less than base; and primes only. 25c. above base. <sup>2</sup> Unassorted 8-lb. coating. <sup>3</sup> Widths up to 12 in. <sup>4</sup> Carbon 0.25 per cent and less. <sup>5</sup> Applies to 29 gage within certain width and length limitations. <sup>6</sup> For merchant trade. <sup>7</sup> Straight lengths as quoted by distributors. <sup>8</sup> Also shafting. For quantities of 20,000 to 39,999 lb. <sup>9</sup> Carload lot to manufacturing trade. <sup>10</sup> Boxed. <sup>11</sup> Ship plates only.



## PRICES

### SEMI-FINISHED STEEL

#### Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are \$2 higher f.o.b. Duluth, billets only, \$2 higher.

*Per Gross Ton*  
Rerolling ..... \$34.00  
Forging quality ..... 40.00

#### Shell Steel

Basic open hearth shell steel f.o.b. Pittsburgh and Chicago.

*Per Gross Ton*  
3 in. to 12 in. .... \$52.00  
12 in. to 18 in. .... 54.00  
18 in. and over ..... 56.00

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting to length, or quantity. This type of steel is for hot rolled sections used for the forging of shells and includes rounds, round squares, and special sections.

#### Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

*Per Gross Ton*  
Open hearth or bessemer ..... \$34.00

#### Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

*Per Lb.*  
Grooved, universal and sheared 1.90c.

#### Wire Rods

(No. 5 to 9/32 in.) *Per Lb.*  
Pittsburgh, Chicago, Cleveland 2.00c.  
Worcester, Mass. .... 2.10c.  
Birmingham .... 2.00c.  
San Francisco .... 2.50c.  
Galveston .... 2.25c.  
9/32 in. to 47/64 in., \$3 a net ton higher. Quantity extras apply.

### ROOFING TERNE PLATE

(F.o.b. Pittsburgh; Package, 112 Sheets)  
20x14 in. 20x28 in.

8-lb. coating I.C...	\$6.00	\$12.00
15-lb. coating I.C...	7.00	14.00
20-lb. coating I.C...	7.50	15.00
25-lb. coating I.C...	8.00	16.00
30-lb. coating I.C...	8.63	17.25
40-lb. coating I.C...	9.75	19.50

### WIRE PRODUCTS

(To the Trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham)

*Base per Keg*  
Standard wire nails ..... \$2.55  
Coated nails ..... 2.55  
Cut nails, carloads ..... 3.85  
*Base per 100 Lb.*  
Annealed fence wire ..... \$3.05  
*Base Column*  
Woven wire fence\* ..... 67  
Fence posts (carloads) ..... 69  
Single loop bale ties ..... 59  
Galvanized barbed wire† ..... 70  
Twisted barless wire ..... 70

\*15½ gage and heavier. †On 80-rod spools in carload quantities.  
Note: Birmingham base same on above items, except spring wire.

### BOLTS, NUTS, RIVETS, SET SCREWS

#### Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

*Per Cent Off List*  
Machine and carriage bolts:  
½ in. and smaller by 6 in. and shorter ..... 65½  
9/16 and ¾ in. by 6 in. and shorter ..... 63½  
¾ to 1 in. by 6 in. and shorter ..... 61  
1½ in. and larger, all lengths ..... 59  
All diameters over 6 in. long ..... 59  
Lag, all sizes ..... 62

Plow bolts ..... 65  
Nuts, cold punched or hot pressed, hex. or square:  
½ in. and smaller ..... 62  
9/16 to 1 in. inclusive ..... 59  
1½ to 1½ in. inclusive ..... 57  
1½ in. and larger ..... 56

On above items, excepting plow bolts, additional allowance of 10 per cent for full container quantities.

On all of the above items there is an additional 5 per cent allowance for car-load shipments.

Semi-fin. hexagon nuts	U.S.S.	S.A.E.
7/16 in. and smaller	64	64
½ in. and smaller	62	62
½ in. through 1 in.	60	60
9/16 to 1 in.	59	59
1½ in. through 1½ in.	57	58
1½ in. and larger	56	56

In full container lots, 10 per cent additional discount.

Stove bolts, packages, nuts loose 71 and 10

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York lots of 200 lb. or over.

Stove bolts in packages, with nuts attached ..... 71  
Stove bolts in bulk ..... 80

#### Large Rivets

(½ in. and larger)

*Base per 100 Lb.*  
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham ..... \$3.75

#### Small Rivets

(7/16 in. and smaller)

*Per Cent Off List*  
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham ..... 65 and 5

#### Cap and Set Screws

*Per Cent Off List*  
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller ..... 64  
Upset set screws, cup and oval points ..... 71  
Milled studs ..... 46  
Flat head cap screws, listed sizes ..... 36  
Filister head cap screws, listed sizes ..... 51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

## NON-FERROUS PRICES

Cents per lb. for early delivery

	July 2	July 3	July 5	July 7	July 8
Copper, Electrolytic¹	12.00	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00	12.00
Tin, Straits, New York²	52.625	52.875	53.125	53.125	53.125
Zinc, East St. Louis	7.25	7.25	7.25	7.25	7.25
Lead, St. Louis³	5.70	5.70	5.70	5.70	5.70

¹ Mine producers' quotations only, delivered Conn. Valley. Deduct ¼c. for approximate New York delivery price. ² Add 0.39c. for New York delivery. ³ Add 0.15c. for New York delivery.

### Warehouse Products

Cents per lb., Delivered

	New York	Cleveland
Tin		
Straits pig	54.00	55.00
Copper		
Electro	13.00	13.25
Castings	12.50	13.15
H. R. Sheets*	20.87	20.87
Seamless tubes*	21.37	21.37
Brass		
Yellow sheets*	19.48	19.48
Yellow, rods*	15.01	15.01
Seamless tubes*	22.23	22.23
Zinc		
Slabs	Nom'al	Nom'al
Sheet, No. 9 casks	Nom'al	Nom'al
Lead		
American pig	6.85	6.35
Bar	8.70	8.85
Cut sheets	9.00	9.10
Antimony		
Asiatic	16.00	17.00
Aluminum		
Virgin, 99%	20.00	21.00
No. 1 remelt, 98-99%	18.00	18.50
Solder		
½ and ½	32.75	32.75
Babbitt		
Anti-friction grade	23.50	21.75

### Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their use.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper		
Hvy. crucible	11.00	11.625
Hvy. and wire	10.00	10.50
Light and bottoms	8.75	9.25
Brass		
Heavy	6.25	6.75
Light	5.25	6.00
No. 1 yel. turn	6.00	6.50
No. 1 red or compo. turnings	9.625	10.625
Hvy. Mach. compo.	9.875	10.125
Lead		
Heavy	5.00	5.50
Aluminum		
Cast	11.00	12.00
Sheet	12.00	13.50
Zinc		5.10

### Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 17c.-18c. a lb.; No. 12 remelt No. 2, standard, 16c. a lb. NICKEL electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 16.50c. a lb., New York; American, 13c. a lb., f.o.b. smelter. QUICK-SILVER, \$190, per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 13.25c. a lb.

\*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33½; on brass sheets and rods, 40; on brass tubes, 33½, and copper tubes, 40.

## PRICES

### ALLOY STEEL

#### Alloy Steel Blooms, Billets and Slabs

Base per gross ton, f.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem.....\$51.00

#### Alloy Steel Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade .....2.70c.  
Delivered, Detroit .....2.80c.

S.A.E. Series Numbers	Alloy Differential, per 100 Lb.
2000 (1.5 Ni) .....	\$0.35

2100 (1.5 Ni) .....	0.75
2300 (3.5 Ni) .....	1.70
2500 (5 Ni) .....	2.55
3100 Ni-Cr .....	0.70
3200 Ni-Cr .....	1.35
3300 Ni-Cr .....	3.80
3400 Ni-Cr .....	3.20
4100 Cr-Mo (0.15 to 0.25 Mo.) ..	0.55
4100 Cr-Mo (0.25 to 0.40 Mo.) ..	0.75
x4340 Cr-Ni-Mo .....	1.70
4340 Cr-Ni-Mo .....	1.85
4600 Ni-Mo (0.2-0.3 Mo, 1.5-2 Ni)	1.20
5100 (0.60-0.90 Cr) .....	0.35
5100 (0.80-1.10 Cr) .....	0.45
5100 Cr spring steel .....	0.15
52-100 Cr. (electric furnace) ..	2.60
6100 Cr-V bar .....	1.20

C-V .....	0.85
6100 Cr-V spring steel .....	0.85

The above differentials are for hot rolled finished products. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

#### Alloy Cold-Finished Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.35c. Delivered Detroit, 3.45c. carlots.

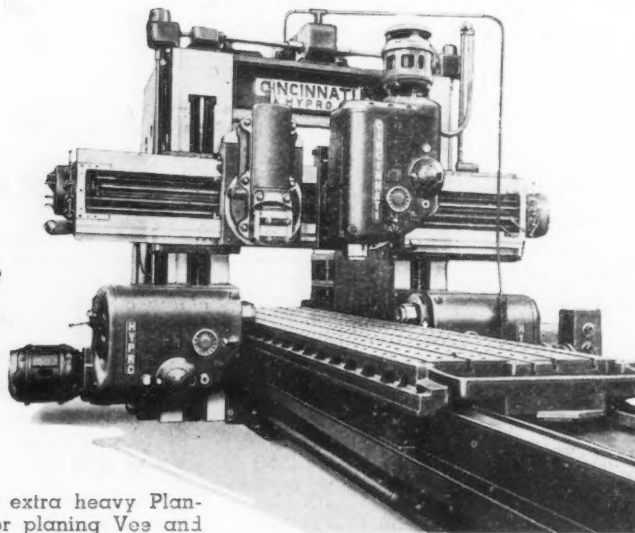
#### Alloy Steel Plates

Base per lb., f.o.b. Pittsburgh, Chicago and Coatesville.  
Open hearth grade .. 3.50c.

# Cincinnati

## HYPRO COMBINATION PLANING AND MILLING MACHINES

**Planing and  
Milling with  
Same Machine  
on a High  
Production  
Basis**



Multiple Tools in extra heavy Planing Head used for planing Vee and Flat and rugged Milling Heads with individual 20 H.P. motors, have reduced production time over 50% on grinder beds. This is only an example of time that can be saved with a machine of this type.

Machine illustrated is of entirely new design, incorporating individually driven 9½" Quill Milling Heads providing spindle speeds of 10 to 200 R.P.M. capable of handling cutters over 18" in diameter.

A wide range of planing speeds is provided to the table through separate planer motor and control. Machine can be instantly changed from milling to planing by movement of selector switch or control handle. If you are interested in placing precision milling and planing on the same machine, the new Hypro Combination Machine merits your close attention.

**Full Particulars Sent on Written Request.**

**Ask for our new bulletin No. 105.**

**PLANERS • PLANER MILLERS • BORING MILLS**

# THE CINCINNATI PLANER CO.

**CINCINNATI, OHIO**

### STAINLESS AND HEAT-RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

#### Chromium-Nickel

No.	304	302
Forging billets .....	21.25c.	20.40c.
Bars .....	25.00c.	24.00c.
Plates .....	29.00c.	27.00c.
Structural shapes ..	25.00c.	24.00c.
Sheets .....	36.00c.	34.00c.
Hot rolled strip.....	23.50c.	21.50c.
Cold rolled strip....	30.00c.	28.00c.
Drawn wire .....	25.00c.	24.00c.

#### Straight-Chromium

No.	410	430	442	446
Bars ...	18.50c.	19.00c.	22.50c.	27.50c.
Plates ..	21.50c.	22.00c.	25.50c.	30.50c.
Sheets ..	26.50c.	29.00c.	32.50c.	36.50c.
H'tstrip ..	17.00c.	17.50c.	24.00c.	35.00c.
C'ld st..	22.00c.	22.50c.	32.00c.	52.00c.

#### 20% Chromium-Nickel Clad Steel

No.	304
Plates .....	18.00c.*
Sheets .....	19.00c.

\*Includes annealing and pickling.

### TOOL STEEL

(F.o.b. Pittsburgh)

	Base per Lb.
High speed .....	67c.
High-carbon-chromium .....	43c.
Oil-hardening .....	24c.
Special .....	22c.
Extra .....	18c.
Regular .....	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

### ELECTRICAL SHEETS

(F.o.b. Pittsburgh)

	Base per Lb.
Field grade .....	3.20c.
Armature .....	3.55c.
Electrical .....	4.05c.
Motor .....	4.95c.
Dynamo .....	5.65c.
Transformer 72 .....	6.15c.
Transformer 65 .....	7.15c.
Transformer 58 .....	7.65c.
Transformer 52 .....	8.45c.

Silicon strip in coils—Sheet price plus silicon sheet extra width extra plus 25c per 100 lb. for coils. Pacific ports add 70c. a 100 lb.



## PRICES

### CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago..	\$54.80
5-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham..	46.00
6-in. and larger f.o.b. dock, San Francisco or Los Angeles or Seattle .....	56.00

Class "A" and gas pipe, \$3 extra; 4-in. pipe is \$3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is \$45 at Birmingham and \$53.80 delivered Chicago.

### BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes.

Minimum Wall  
(Net base prices per 100 ft., f.o.b. Pittsburgh, in carload lots)

	Seamless Cold Drawn	Lap Weld, Hot Rolled
1 in. o.d. 13 B.W.G.	\$9.01	\$7.82
1 1/4 in. o.d. 13 B.W.G.	10.67	9.26
1 1/2 in. o.d. 13 B.W.G.	11.70	10.23
1 3/4 in. o.d. 13 B.W.G.	13.42	11.64
2 in. o.d. 13 B.W.G.	15.03	13.04
2 1/4 in. o.d. 13 B.W.G.	16.76	14.54
2 1/2 in. o.d. 12 B.W.G.	18.45	16.01
2 3/4 in. o.d. 12 B.W.G.	20.21	17.54
3 in. o.d. 12 B.W.G.	22.48	19.50
3 1/2 in. o.d. 11 B.W.G.	28.37	24.62
4 in. o.d. 10 B.W.G.	35.20	30.54
4 1/2 in. o.d. 10 B.W.G.	43.04	37.35
5 in. o.d. 9 B.W.G.	54.01	46.87
6 in. o.d. 7 B.W.G.	82.93	71.96

Extras for less carload quantities:

40,000 lb. or ft. over .....	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft. ....	65%

### STEEL AND WROUGHT IRON PIPE AND TUBING

#### Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought iron pipe)

Base Price = \$200 Per Net Ton

#### Butt Weld

Steel	Black	Galv.
1/8 in. ....	56	33
1/4 to 3/8 in. ....	59	40 1/2
1/2 in. ....	63 1/2	51
3/4 in. ....	66 1/2	55
1 to 3 in. ....	68 1/2	57 1/2

Wrought Iron	Black	Galv.
1/4 and 3/8 in. ....	+9	+33
1/2 in. ....	24	3 1/2
3/4 in. ....	30	10
1 and 1 1/4 in. ....	34	16
1 1/2 in. ....	38	18 1/2
2 in. ....	37 1/2	18

#### Lap Weld

Steel	Black	Galv.
2 in. ....	61	40 1/2
2 1/2 and 3 in. ....	64	52 1/2
3 1/2 to 6 in. ....	66	54 1/2
7 and 8 in. ....	65	52 1/2
9 and 10 in. ....	64 1/2	52
11 and 12 in. ....	63 1/2	51

Wrought Iron	Black	Galv.
2 in. ....	30 1/2	12
2 1/2 to 3 1/2 in. ....	31 1/2	14 1/2
4 in. ....	33 1/2	18
4 1/2 to 8 in. ....	32 1/2	17
9 to 12 in. ....	28 1/2	12

#### Butt weld, extra strong, plain ends

Steel	Black	Galv.
1/8 in. ....	54 1/2	38 1/2
1/4 to 3/8 in. ....	56 1/2	42 1/2
1/2 in. ....	61 1/2	50 1/2
3/4 in. ....	65 1/2	54 1/2
1 to 3 in. ....	67	57

#### Wrought Iron

1/4 and 3/8 in. ....	+10	+46
1/2 in. ....	25	6
3/4 in. ....	31	12
1 to 2 in. ....	38	19 1/2

#### Lap weld, extra strong, plain ends

Steel	Black	Galv.
2 in. ....	59	48 1/2
2 1/2 and 3 in. ....	63	52 1/2
3 1/2 to 6 in. ....	66 1/2	56

	Black	Galv.
7 and 8 in. ....	65 1/2	53
9 and 10 in. ....	64 1/2	52
11 and 12 in. ....	63 1/2	51

#### Wrought Iron

2 in. ....	33 1/2	15 1/2
2 1/2 to 4 in. ....	39	22 1/2
4 1/2 to 6 in. ....	37 1/2	21
7 and 8 in. ....	38 1/2	21 1/2
9 to 12 in. ....	32	17 1/2

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or \$4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or \$2 a ton higher, on all butt weld 8 in. and smaller.



### AS BUSY AS A ONE-MAN BAND!

Wyandotte MK 50 Solvent Detergent is turning in spectacular results on many different kinds of metal cleaning jobs. Here are a few of the operations this one all-around compound can complete at low cost:

MK 50 will clean cold rolled steel stampings prior to painting and lacquering — clean stainless steel after stamping and drawing—clean brass after machining, aluminum castings prior to anodizing, and die castings and special alloy steels after machining.

That's an example of one Wyandotte metal cleaner for many jobs.

And there are many Wyandotte Compounds specially built for one special kind of work.

Your Wyandotte Service Representative will be glad to show you which Wyandotte Products you need in your shop. Call him today.



Service Representatives in 88 Cities

**THE J. B. FORD SALES CO.**  
**WYANDOTTE, MICHIGAN**

## PRICES

### ORES

#### Lake Superior Ores

Delivered Lower Lake Ports	
	Per Gross Ton
Old range, bessemer, 51.50%..	\$4.75
Old range, non-bessemer, 51.50%	4.60
Mesaba, bessemer, 51.50%....	4.60
Mesaba, non-bessemer, 51.50%	4.45
High phosphorus, 51.50%.....	4.35

#### Foreign Ores\*

C.i.f. Philadelphia or Baltimore, Exclusive of Duty	
	Per Unit
African, Indian, 44 to 48% Mn.	61c. to 65c.

African, Indian, 49 to 51% Mn.	71c. to 72c.
Brazilian, 46 to 48% Mn..69c to 70c.	
Cuban, del'd, duty free, 51% Mn.	.....

#### Per Short Ton Unit

Tungsten, Chinese, Wolframite, duty paid, delivered.....	\$24 to \$25
Tungsten, domestic, scheelite, delivered .....	\$24 to \$25
Chrome ore, lump c.i.f. Atlantic Seaboard, per gross ton; South Cuban, 32% .....	\$18.00
Indian, 48-50% .....	\$38 to \$40
Rhodesian, 48% .....	\$35 to \$40

### RAILS, TRACK SUPPLIES

#### F.o.b. Mill

Standard rails, heavier than 60 lb., gross ton.....	\$40.00
Angle bars, 100 lb. ....	2.70

#### F.o.b. Basing Points

Light rails (from billets), gross ton .....	\$40.00
Light rails (from rail steel), gross ton .....	39.00

#### Base per Lb.

Cut spikes .....	3.00c.
Screw spikes .....	4.55c.
Tie plates, steel .....	2.15c.
Tie plates, Pacific Coast.....	2.30c.
Track bolts, steam railroads...	4.15c.
Track bolts, discount to jobbers all sizes (per 100 counts)....	65-5

Basing points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond, Va.

#### FLUORSPAR Per Net Ton

Domestic washed gravel, 85-5 f.o.b. Kentucky and Illinois mines, all rail.....	\$20.00 to \$21.00
Domestic, f.o.b. Ohio River land- ing barges .....	20.00 to 21.00
No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines....	20.00 to 21.00
Foreign, 85% calcium fluoride, not over 5% Si., c.i.f. Atlantic ports, duty paid.....	Nominal
Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2½% silicon, f.o.b. Illi- nois and Kentucky mines....	31.00
As above, in bags, f.o.b. same mines .....	32.60

### REFRACTORIES

#### Fire Clay Brick Per 1000 f.o.b. Works

Super-duty brick at St. Louis..	\$64.60
First quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois .....	51.30
First quality, New Jersey.....	56.00
Second quality, Pennsylvania, Maryland, Kentucky, Missouri, and Illinois .....	46.55
Second quality, New Jersey....	51.00
No. 1 Ohio .....	39.90
Ground fire clay, per ton.....	7.60

#### Silica Brick

Pennsylvania .....	\$51.30
Chicago District .....	58.90
Birmingham .....	51.30
Silica cement, net ton (Eastern)	9.00

#### Chrome Brick

#### Net per Ton

Standard f.o.b. Baltimore, Plym- outh Meeting and Chester...	\$54.00
Chemically bonded f.o.b. Balti- more, Plymouth Meeting and Chester, Pa. ....	54.00

#### Magnesite Brick

Standard f.o.b. Baltimore and Chester .....	\$76.00
Chemically bonded, f.o.b. Balti- more .....	65.00

#### Grain Magnesite

Imported, f.o.b. Baltimore and Chester, Pa. (in sacks).....	(—)*
Domestic, f.o.b. Baltimore and Chester in sacks.....	\$44.00
Domestic, f.o.b. Chewelah, Wash. (in bulk) .....	22.00

\*None available.

## GAIN THIS EXTRA SPACE FOR PRODUCTION



### INSTALL KINNEAR ROLLING DOORS!

Gain floor space! Gain wall space! Gain ceiling space for conveyor equipment, trolley ducts, or other production-speeding units. Get all this extra, usable room in your plant by installing Kinnear Rolling Doors! They open straight upward, coiling compactly above the door lintel. They stay out of the way of all plant activity at all times. When open, they leave doorways completely clear, remaining out of reach of damage.

You gain extra protection, too, with Kinnear Rolling Doors! Their rugged, heavy-duty, all-steel, interlocking-slat curtain (originated by Kinnear!) not only stands up longer under the most gruelling service, but also gives greater resistance to fire, more protection against intrusion, theft, sabotage, or accidental damage. And if a Kinnear Door should be damaged, repair is easy and economical, because the slats may be replaced individually or in groups of any number.

Kinnear Rolling Doors are built to fit any opening, in new or old buildings. Equipped for motor, manual or mechanical operation. Easy and economical to install. Write for details today! The Kinnear Mfg. Co., 1760-80 Fields Ave., Columbus, Ohio.

**Saving Ways  
in Doorways**

**KINNEAR**  
ROLLING DOORS



## PRICES

### FERROALLOYS

#### Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

*Per Gross Ton*

Domestic, 80% (carload).....\$120.00  
Domestic, 78-82%, carlots, f.o.b.  
Tennessee furnaces ..... 145.00

#### Spiegeleisen

*Per Gross Ton Furnace*

Domestic, 19 to 21%.....\$36.00  
Domestic, 26 to 28%..... 49.50

#### Electric Ferrosilicon

*Per Gross Ton, Delivered Lump Size*

50% (carload lots, bulk).....\$74.50\*  
50% (ton lots, packed)..... 87.00\*  
75% (carload, lots, bulk)....135.00\*  
75% (ton lots, packed).....151.00\*

#### Bessemer Ferrosilicon

*Per Gross Ton, F.o.b. Jackson, Ohio*

10.00 to 10.50%.....\$34.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2% \$1 per ton additional.

Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

#### Silvery Iron

*Per Gross Ton, Silicon 6.00 to 6.50%*

Jackson, Ohio .....\$29.50\*  
Buffalo, N. Y. .... 30.75\*

For each additional 0.5% silicon up to 11%, 50c. a ton is added. Above 11% add 75c. a ton.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed.

Manganese, each unit over 2%, \$1 a ton additional. Phosphorus 0.75% or over, \$1 a ton additional.

\*Official maximum prices established by OPACS on June 25.

#### Ferrochrome

*Per Lb. Contained Cr., Delivered Carlots Lump Size, on Contract*

4 to 6% carbon.....11.00c.  
2% carbon .....17.50c.  
1% carbon .....18.50c.  
0.10% carbon .....20.50c.  
0.06% carbon .....21.00c.

Spot prices are ¼ c. per lb. of contained chromium higher.

#### Silico-Manganese

*Per Gross Ton, Delivered, Lump Size, Bulk, on Contract*

3% carbon .....\$113.00\*  
2.50% carbon ..... 118.00\*  
2% carbon ..... 123.00\*  
1% carbon ..... 133.00\*

#### Other Ferroalloys

Ferrotungsten, per lb. contained W, del. carload..... \$2.00  
Ferrotungsten, 100 lb. and less 2.25  
Ferrovanadium, contract, per lb. contained V, del'd \$2.70 to \$2.90†  
Ferrocolumbium, per lb. contained columbium f.o.b. Niagara Falls, N. Y., ton lots ..... \$2.25†  
Ferrocobaltititanium, 15 to 18% Ti, 7 to 8% C. f.o.b. furnace carload and contract, per net ton.....\$142.50  
Ferrocobaltititanium, 17 to 20% Ti, 3 to 5% C. f.o.b. furnace, carload and contract per net ton.....\$157.50  
Ferrophosphorus, electric or blast furnace material, in

\*Spot prices are \$5 per ton higher.  
†Spot prices are 10c. per lb. of contained element higher.

carloads, f.o.b. Anniston, Ala., for 18%, with \$3 unitage, freight equalized with Rockdale, Tenn., per gross ton ..... 58.50

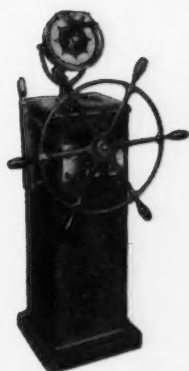
Ferrophosphorus, electrolytic 23-26% in carlots, f.o.b. Monsato (Siglo), Tenn., 24% per gross ton, \$3 unitage, freight equalized with Nashville ..... 75.00

Ferromolybdenum, per lb. Mo., f.o.b. furnace ..... 95c.  
Calcium molybdate, per lb. Mo, f.o.b. furnace ..... 80c.

Molybdenum oxide briquettes 48-52% Mo, per lb. contained Mo, f.o.b. Langeloth, Pa. 80c.  
Molybdenum oxide, in cans, per lb. of contained Mo, f.o.b. Washington, Pa. .... 80c.

### FUEL OIL

No. 3, f.o.b. Bayonne, N. J....4.90c.  
No. 6, f.o.b. Bayonne, N. J....3.21c.  
No. 5 Bur. Stds., del'd Chicago...3.25c.  
No. 6 Bur. Stds., del'd Chicago...2.75c.  
No. 3 distillate, del'd Cleveland...6.25c.  
No. 4 indus., del'd Cleveland...5.75c.  
No. 5 indus., del'd Cleveland...5.375c.  
No. 6 indus., del'd Cleveland...5.00c.

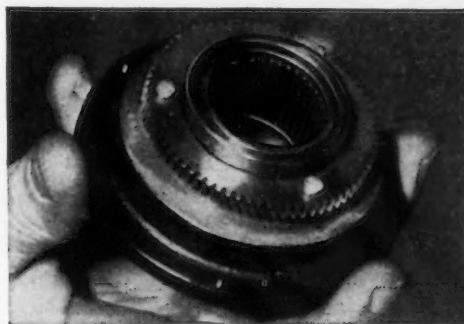


## NEEDLE BEARINGS

**AID DESIGN AND  
reduce friction for  
SPERRY GYRO-PILOT**



**THE SPERRY GYRO-PILOT** has elevated navigation to a more exact science throughout the world. Low coefficient of friction is essential in its design, so Torrington Needle Bearings are used in important assemblies. They assure lasting anti-friction performance. And their small O. D. — no more than for a plain bushing—permits simplified design and smaller surrounding parts.



**MAINTENANCE LUBRICATION IS PRACTICALLY ELIMINATED** in the Gyro-Pilot's Servo Assembly by Torrington Needle Bearing's large grease retention capacity. Another advantage—Needle Bearing units are quickly and economically installed in the simplest type of housing. Initial costs are surprisingly low. They are used today in hundreds of important types of mechanisms.

If your product does not at present incorporate the advantages and economies of Torrington Needle Bearings—small size, light weight, high radial load capacity, ease of installation and minimum of lubrication and wear—consult our Engineering Department today. Write or wire for Catalog No. 110. For Needle Bearings to be used in heavier service, ask our associate, Bantam Bearings Corporation, South Bend, Indiana, for Booklet 103X.



**THE TORRINGTON COMPANY, TORRINGTON, CONN., U. S. A. • ESTABLISHED 1866**

*Makers of Needle and Ball Bearings*

New York Boston Philadelphia Detroit Cleveland Chicago London, England

## TORRINGTON NEEDLE BEARING

THE IRON AGE, July 10, 1941—141

# PRICES

## COKE

Per Net Ton

Furnace, f.o.b. Connellsville, prompt .....	\$6.00 to \$6.25
Foundry, f.o.b. Connellsville, prompt .....	\$6.75 to \$7.00
F'dry, by-product, Chicago.....	10.50
F'dry, by-product, New England	13.75
Foundry, by-product, Newark or Jer- sey City .....	\$12.45 to 12.95
F'dry, by-product, Philadelphia.	12.13
F'dry, by-product, Cleveland...	12.30
F'dry, by-product, Cincinnati...	11.75
Foundry, Birmingham .....	8.50
F'dry, by-product, St. Louis	
	\$10.75 to \$11.00

## BRITISH

Per Gross Ton, f.o.b. United Kingdom  
Ports

Ferromanganese, export	£29 16s. 3d.
Tin plate, per base box.	32s. to 33s.
Steel bars, open hearth...	£16 10s.
Beams, open hearth....	£19 10s.
Channels, open hearth...	£19 10s.
Angles, open hearth....	£15 10s.
Black sheets, No. 24, gage	
£22 5s. max.* £22 5s. min.**	
Galvanized sheets, No. 24 gage	
£25 12s. 6d max.*; £25 12s. 6d. min.**	

\*Empire markets only.

\*\*Other than Empire markets.

## PIG IRON (Per Gross Ton)

All prices set in bold face type are maxima established by OPACS on June 24. Other domestic prices are delivered quotations computed on the basis of the official maxima.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phos.
Boston .....	\$25.50	\$25.00	\$26.50	\$26.00	.....
Brooklyn .....	27.50	.....	.....	28.00	.....
Jersey City .....	26.53	26.03	27.53	27.03	.....
Philadelphia .....	25.84	25.34	26.84	26.34	.....
Bethlehem, Pa. ....	<b>\$25.00</b>	<b>\$24.50</b>	<b>\$26.00</b>	<b>\$25.50</b>	.....
Everett, Mass. ....	<b>25.00</b>	<b>24.50</b>	<b>26.00</b>	<b>25.50</b>	.....
Swedeland, Pa. ....	<b>25.00</b>	<b>24.50</b>	<b>26.00</b>	<b>25.50</b>	.....
Steelton, Pa. ....	.....	<b>24.50</b>	.....	.....	<b>29.50</b>
Birdsboro, Pa. ....	<b>25.00</b>	<b>24.50</b>	<b>26.00</b>	<b>25.50</b>	<b>29.50</b>
Sparrows Point, Md. ....	<b>25.00</b>	<b>24.50</b>	.....	.....	.....
Erie, Pa. ....	<b>24.00</b>	<b>23.50</b>	<b>25.00</b>	<b>24.50</b>	.....
Neville Island, Pa. ....	<b>24.00</b>	<b>23.50</b>	<b>24.50</b>	<b>24.00</b>	.....
Sharpsville, Pa.* .....	<b>24.00</b>	<b>23.50</b>	<b>24.50</b>	<b>24.00</b>	.....
Buffalo .....	<b>24.00</b>	<b>23.00</b>	<b>25.00</b>	<b>24.50</b>	<b>29.50</b>
Cincinnati .....	24.44	24.61	.....	25.11	.....
Canton, Ohio .....	25.39	24.89	25.89	25.39	.....
Mansfield, Ohio .....	25.94	25.44	26.44	25.94	.....
St. Louis .....	24.50	24.02	.....	.....	.....
Chicago .....	<b>24.00</b>	<b>23.50</b>	<b>24.50</b>	<b>24.00</b>	.....
Granite City, Ill. ....	<b>24.00</b>	<b>23.50</b>	<b>24.50</b>	<b>24.00</b>	.....
Cleveland .....	<b>24.00</b>	<b>23.50</b>	<b>24.50</b>	<b>24.00</b>	.....
Hamilton, Ohio .....	<b>24.00</b>	<b>23.50</b>	.....	<b>24.00</b>	.....
Toledo .....	<b>24.00</b>	<b>23.50</b>	<b>24.50</b>	<b>24.00</b>	.....
Youngstown* .....	<b>24.00</b>	<b>23.50</b>	<b>24.50</b>	<b>24.00</b>	.....
Detroit .....	<b>24.00</b>	<b>23.50</b>	<b>24.50</b>	<b>24.00</b>	.....
St. Paul .....	26.63	.....	27.13	26.63	.....
Duluth .....	<b>24.50</b>	.....	<b>25.00</b>	<b>24.50</b>	.....
Birmingham .....	<b>20.38</b>	<b>19.00</b>	<b>25.00</b>	.....	.....
Los Angeles, San Fran- cisco and Seattle .....	27.50	.....	.....	.....	.....
Provo, Utah .....	<b>22.00</b>	.....	.....	.....	.....
Montreal .....	27.50	27.50	.....	28.00	.....
Toronto .....	25.50	25.50	.....	26.00	.....

## GRAY FORGE

Valley or Pittsburgh fee .....

\$23.50

## CHARCOAL

Lake Superior fee .....	\$28.00
Lyles, Tenn. high phos. fee.....	28.50
Lyles, Tenn., low phos. fee.....	33.00
Delivered Chicago .....	31.34

**Switching Charges:** Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

**Silicon Differentials:** Basing point prices are subject to an additional charge not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade (1.75 per cent to 2.25 per cent).

**Phosphorous Differential:** Basing point prices are subject to a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over.

**Manganese Differentials:** Basing point prices are subject to an additional charge not to exceed 50c. a ton for each 0.50 per cent manganese content in excess of 1.00 per cent.

\*Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

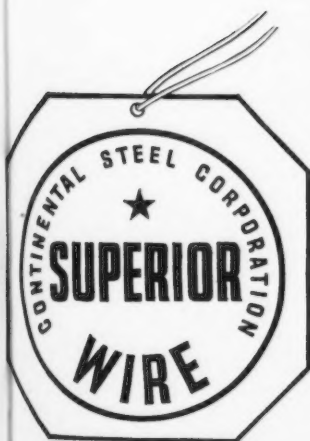
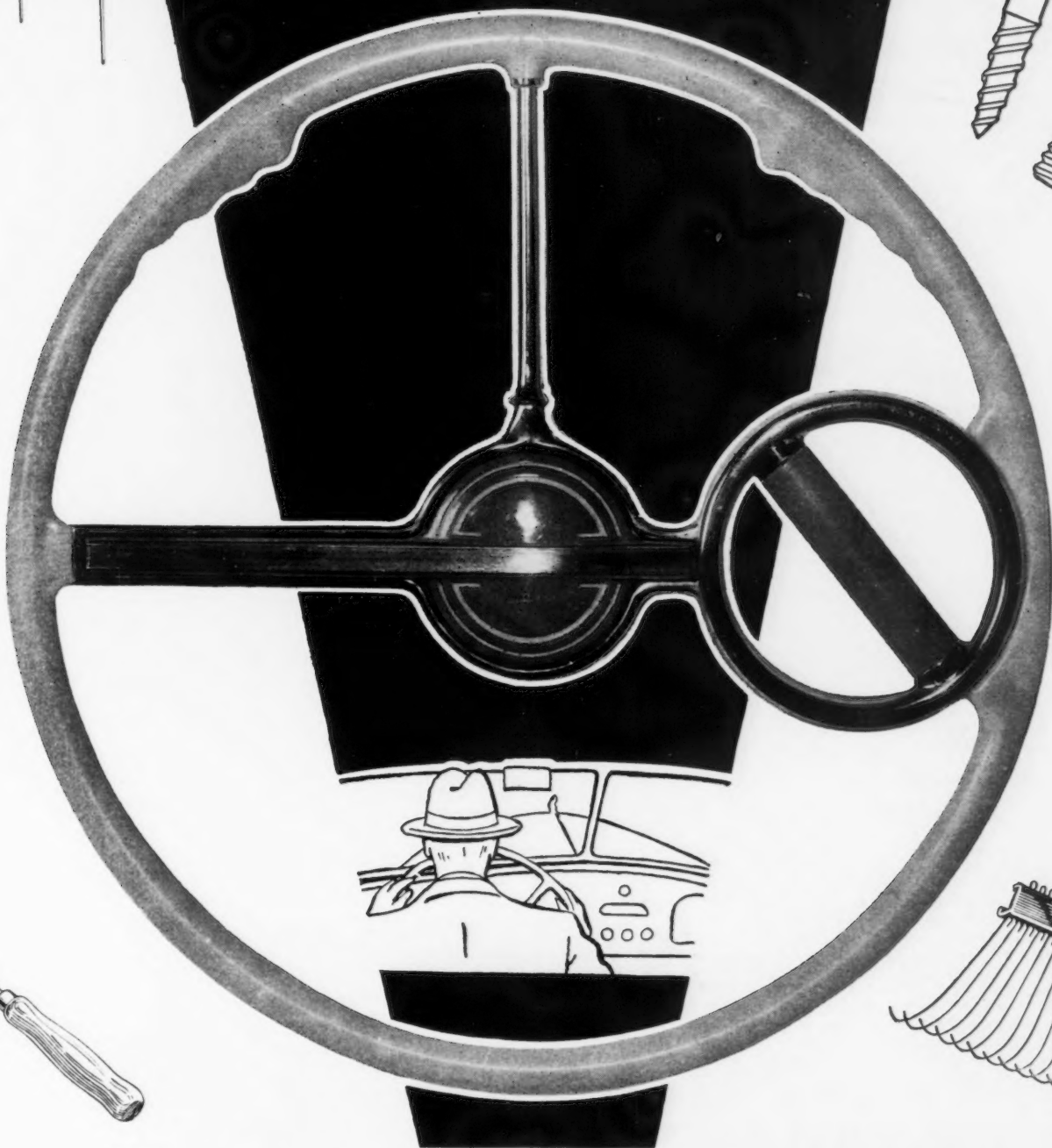
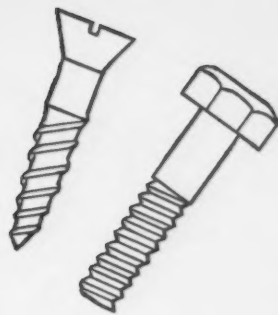
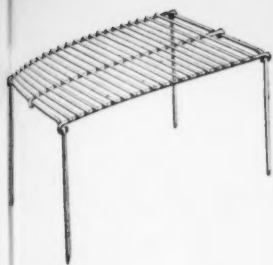
## WAREHOUSE PRICES

	Pitts- burgh	Chicago	Cleve- land	Phila- delphia	New York	Detroit	Buffalo	Boston	Birm- ingham	St. Louis	St. Paul	Mil- waukee	Los Angeles
Sheets, hot rolled .....	\$3.35	\$3.05	\$3.35	\$3.75	\$3.58	\$3.43	\$3.25	\$3.71	\$3.45	\$3.39	\$3.30	\$3.38	\$5.10
Sheets, cold rolled .....	.....	4.10	4.05	4.05	4.60	4.30	4.30	3.68	.....	4.12	4.35	4.23	7.30
Sheets, galvanized .....	4.75	4.60	4.62	5.00	5.00	4.84	4.75	5.11	4.75	4.24	4.75	4.98	6.30
Strip, hot rolled .....	3.60	3.40	3.50	3.95	3.96	3.68*	3.82	4.06	3.70	4.99	3.65	3.73	.....
Strip, cold rolled .....	3.20	3.30	3.20	3.31	3.51	3.20	3.52	3.46	.....	3.61	3.83	3.54	.....
Plates .....	3.40	3.55	3.40	3.75	3.76	3.60	3.62	3.85	3.55	3.69	3.80	3.68	4.95
Structural shapes .....	3.40	3.55	3.58	3.75	3.75	3.65	3.40	3.85	3.55	3.69	3.80	3.68	4.95
Bars, hot rolled .....	3.35	3.50	3.25	3.85	3.84	3.43	3.35	3.98	3.50	3.64	3.75	3.63	**4.15
Bars cold finished .....	3.65	3.75	3.75	4.06	4.09	3.80	3.75	4.13	4.43	4.02	4.34	3.88	6.60
Bars, ht. rld. SAE 2300 ..	7.20	7.10	7.55	7.31	7.60	7.67	7.35	7.50	.....	7.72	7.45	7.58	10.35
Bars, ht. rld. SAE 3100 ..	5.75	5.65	5.85	5.86	5.90	5.97	5.65	6.05	.....	6.02	6.00	5.88	9.35
Bars, cd. drn. SAE 2300 ..	8.15	8.15	8.40	8.56	8.84	8.70	8.40	8.63	.....	8.77	8.84	8.63	11.35
Bars, cd. drn. SAE 3100 ..	6.75	6.75	7.75	7.16	7.19	7.05	6.75	7.23	.....	7.12	7.44	6.98	10.35

**BASE QUANTITIES:** Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb., galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions: Chicago, galvanized sheets, 500 to 1499 lb.; Philadelphia, galvanized sheets, one to nine bundles, cold rolled sheets, 1000 to 1999 lb.; Detroit, galvanized sheets, 500 to 1499 lb.; Buffalo, cold rolled sheets, 500 to 1500 lb., galvanized sheets, 450 to 1499 lb., cold rolled strips, 0.0971 in. thick; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; Birmingham, hot rolled sheets, strip and bars, plates and shapes, 400 to 3999 lb., galvanized sheets, 500 to 1499 lb.; St. Louis, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb., cold rolled strip 0.095 in. and lighter; Milwaukee, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb.; New York, hot rolled sheets, 0 to 1999 lb., cold rolled sheets, 400 to 1499 lb.; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lbs.; Los Angeles, cold rolled sheets, 300 to 1999 lb., galvanized sheets, 24 ga.—1 to 1499 lb. Extras for size, quality, etc., apply on above quotations.

\*12 gage and heavier, \$3.43. \*\*Over 4 in. wide and over 1 in. thick, \$4.95.





## WIRE FOR A THOUSAND USES

In the core of a steering wheel, the teeth of a garden hoe, a screw, a bolt—in these and hundreds of other products you will find Continental SUPERIOR Wire. Continental produces wire in sizes from 34 gauge to  $\frac{5}{8}$ -inch rods . . . in standard and many special shapes . . . and in a wide range of finishes to serve almost any manufacturing need.

If you have a special problem requiring wire in special shapes or wire possessing special fabricating qualities, Continental's experience as a manufacturer of wire for more than a thousand uses will be helpful to you. Write or wire today for complete information.

**CONTINENTAL STEEL CORPORATION, Kokomo, Indiana**  
Plants at Canton, Indianapolis and Kokomo



# CONTINENTAL

## STEEL CORPORATION

**SHEETS:** Black, Galvanized, Copperior, Hot and Cold Rolled, Special Coated, Long Terme, etc.

**WIRE:** Bright Basic, Annealed, KONIK, Coppered, Tinned, Special Manufacturer's, etc.

# Sales Possibilities

... CONSTRUCTION, PLANT EXPANSION AND EQUIPMENT BUYING

## North Atlantic States

● **Scovill Mfg. Co., Inc.**, Waterbury, Conn., brass, bronze and other metal products, has let general contract to Turner Construction Co., 420 Lexington Avenue, New York, for four-story and basement addition, 40 to 80 ft. wide and 330 ft. long, for expansion in casting shop. Cost close to \$500,000 with equipment.

**Municipal Gas and Electric Department**, Holyoke, Mass., has let general contract to Casper Ranger Construction Co., 6 Newton Street, at \$97,082 for addition to municipal electric plant, exclusive of equipment, for which contracts will be placed separately.

**Dexter Corp.**, 30 Fairview Avenue, Edgewood Station, Providence, R. I., jewelry and plated specialties, has let general contract to A. F. Smiley Construction Co., 308 Main Street, Pawtucket, R. I., for new one-story and basement plant, 120 x 262 ft., on Dexter Street, Providence. Cost close to \$110,000 with equipment. Michael Traficante, 175 Taunton Avenue, East Providence, is architect.

**United States Engineer Office**, Park Square Building, Boston, asks bids until July 16 for pumping stations at Lowell, Mass. (Circular 175-41-120).

**Lyman Gun Sight Corp.**, Middlefield, Conn., has let general contract to H. Wales Lines Co., 134 State Street, Meriden, Conn., for two-story and basement addition. Cost close to \$50,000 with equipment.

**American Insulated Wire Corp.**, 610 Manton Avenue, Providence, R. I., electric wires, etc., has let general contract to Joseph P. Flynn, 112 Lenox Avenue, for one-story addition, 75 x 137 ft. Cost close to \$70,000 with equipment. Barker & Turoff, Grosvenor Building, are architects.

**Board of Education**, Chicopee, Mass., will take bids soon on general contract for new two-story and basement trade and vocational school, 62 x 185 ft., with two one-story extensions, 80 x 200 ft., and 50 x 150 ft. Cost about \$185,000 with equipment. H. J. Tessier, 220 Dwight Street, Springfield, Mass., is architect.

**Sperry Gyroscope Co., Inc.**, 40 Flatbush Avenue Extension, Brooklyn, has approved plans for new one-story plant, 540 x 1440 ft., and smaller units, with three-story administration building, totaling about 1,350,000 sq. ft., in all, at North Hempstead, L. I., where about 124 acres has been secured. Production will be for government, which will retain title to plant. Cost estimated at \$20,280,000, of which about \$9,980,000 will be used for site and buildings, and \$10,300,000 for equipment. Fund in amount noted will be provided by Defense Plant Corp., Washington. Company will continue present plant in Brooklyn, where work is under way on two-story addition, 100 x 208 ft., for which Thompson-Starrett Co., 444 Madison Avenue, New York, is general contractor. North Hempstead project will be known as Lakeville works.

**American Locomotive Co.**, Railway Steel Spring Division, 30 Church Street, New York, has asked bids on general contract for one-story addition to branch plant at Latrobe, Pa. Cost over \$85,000 with equipment.

**Rheem Mfg. Co., Inc.**, 30 Rockefeller Plaza, New York, steel barrels, drums, etc., has let general contract to Brown & Matthews Inc., 122 East Forty-second Street, for one-story addition to branch plant on South Kedzie Avenue, Chicago, forming second unit of expansion program now under way. Cost over \$300,000 with equipment.

**General Electric Co.**, Schenectady, N. Y., plans additions to branch plants at Erie, Pa., and Lynn, Mass., for production of equipment for government, each consisting of several one-story structures, totaling collectively about 475,000 sq. ft. floor space. First noted plant will be used for production of turbines

and parts, while Lynn expansion will be used for manufacture of reduction gears. Cost over \$20,000,000, fund to be provided by Defense Plant Corp., Washington. Company also will carry out expansion at branch works at Fort Wayne, Ind., and has work in progress on new plant at Everett, Mass., for production for government.

**Scintilla Magneto Division**, Bendix Aviation Corp., Sidney, N. Y., has let general contract to Frank Lewis & Son, Bainbridge, N. Y., for one-story addition. Cost close to \$125,000 with equipment.

**Eastman Kodak Co.**, Kodak Park, Rochester, N. Y., has let general contract to A. W. Hopewell & Sons Co., 569 Lyell Avenue, for four-story and basement addition, about 96 x 200 ft. Cost over \$450,000 with equipment.

**War Department**, Washington, has authorized new depot and plant for Air Corps at Rome, N. Y. Project will include one-story aircraft repair works, one-story radio repair and signal supply shop, equipment repair building, chemical storage and distribution building, engine repair works, quartermaster shop, paint and oil storage building, warehouses, hangars, steam power house and other structures. Fund of about \$13,123,000 will be arranged for entire development.

**Baker & Co., Inc.**, 113 Astor Street, Newark, N. J., platinum and rare metal products, has let general contract to Winger, Selby & Herrick, Inc., 152 West Forty-second Street, New York, for three-story and basement addition, 50 x 100 ft. Cost close to \$100,000 with equipment. Epple & Kahrs, 15 Washington Street, Newark, are architects and engineers.

**Moser Jewel Co.**, 367 Division Street, Perth Amboy, N. J., jewel bearings for precision apparatus, has let general contract to F. & C. Haerter, 769 Dewey Avenue, West New York, N. J., for new two-story and basement plant at Fayette and Dorsey Streets, for production of equipment for government. Cost over \$65,000 with machinery. M. G. Tuzik, 214 Smith Street, is architect.

**Jacques Wolf & Co.**, Lexington Avenue, Clifton, N. J., chemicals, have let general contract to H. Montague & Son, Inc., 880 Bergen Avenue, Jersey City, N. J., for new three-story plant at Carlstadt, N. J., 45 x 120 ft. Cost over \$85,000 with equipment.

**Schweitzer Paper Co.**, affiliated with Peter J. Schweitzer, Inc., 994 Newark Avenue, Elizabeth, N. J., cigarette papers, bond and carbon papers, etc., has acquired mill at Mount Holly Springs, Pa., and will modernize for branch plant. Cost over \$100,000 with equipment.

**Floyd-Wells Co.**, Royersford, Pa., stoves, ranges and parts, has let general contract to W. A. Griffith, 31 Chestnut Street, Pottstown, Pa., for two-story addition, 60 x 200 ft. Cost close to \$85,000 with equipment.

**Parkway Oil Co.**, Thirty-first Street and Grays Ferry Avenue, Philadelphia, oil and gasoline products, has acquired about 20,000 sq. ft. adjoining for expansion in storage and distribution, including new steel tanks and other facilities.

**Oil City Tank & Boiler Co.**, Oil City, Pa., plans extensions and improvements, including equipment. Cost close to \$45,000.

**H. K. Porter Co., Inc.**, Forty-ninth and Harrison Streets, Pittsburgh, industrial locomotives and parts, tube mills, etc., has leased former plant of Conemaugh Iron Works, Blairsville, Pa., and will modernize for branch plant for production of shells for government.

**Peoples Natural Gas Co.**, 545 William Penn Way, Pittsburgh, has approved plans for new two-story and basement mechanical shop, equipment storage and distributing building at Blairsville, Pa. Cost close to \$50,000 with equipment.

**Linde Air Products Co., Inc.**, 30 East Forty-second Street, New York, industrial oxygen,

acetylene gas, welding apparatus, etc., has asked bids on general contract for new plant at Juniata, Pa., comprising one and multi-story units. Cost over \$200,000 with equipment.

**Bureau of Yards and Docks**, Navy Department, Washington, asks bids (no closing date stated) for 109 electrically-operated capstans for dry docks at navy yards at Portsmouth, N. H.; Brooklyn; Philadelphia; Portsmouth, Va.; and Charleston, S. C.; naval dry docks, Bayonne, N. J.; Roosevelt Base, Terminal Island, Cal.; naval operating base, San Diego, Cal.; and naval dry docks, Vieques, P. R. (Specifications 10477).

**Westinghouse Electric & Mfg. Co.**, Radio Division, 2519 Wilkens Avenue, Baltimore, has let general contract to Charles R. Scrivener Co., Old Frederick Road, for one-story addition for storage and distribution. Cost about \$60,000 with equipment.

**Bureau of Supplies and Accounts**, Navy Department, Washington, asks bids until July 15 for high-speed scroll saws (Schedule 7674), pipe and nipple threading machines (Schedule 7648), all motor-driven; distributors, generators, motors, coils, switches, etc. (Schedule 7709), woodworking surfacers (Schedule 7617); until July 18 for cable grips (Schedule 7705), metal locks (Schedule 7701), motor-driven pneumatic forging hammer (Schedule 7690), for Eastern and Western yards.

**Fleetwings, Inc.**, Bristol, Pa., airplanes and parts, has started construction of its new plant which will add 170,000 sq. ft. to its present manufacturing floor space of 220,000 sq. ft.

**Lyon Iron Works**, Greene, N. Y., has completed additions to its plant which will add 50 per cent to its production facilities.

## The South

● **Commercial Solvents Corp.**, 17 East Forty-second Street, New York, plans new plant at Sterlington, La., for production of synthetic ammonia for government. It will include one and multi-story manufacturing and processing units, boiler plant, machine shop, pumping station and other structures. Cost about \$10,000,000 with equipment. Fund will be furnished by Defense Plant Corp., Washington.

**Southern Cotton Oil Co.**, Canal Bank Building, New Orleans, plans two one-story additions to cottonseed oil mill, Little Rock, Ark., for expansion in production division and balancing press department. Cost close to \$45,000 with equipment.

**Plantation Pipe Line Co.**, recently organized subsidiary of Standard Oil Co. of Kentucky, Inc., 426 West Bloom Street, Louisville, and other oil interests, has acquired about 20 acres on Hunter Loop Road, near Montgomery, Ala., for new gasoline bulk storage and distributing terminal, in connection with pipe line to be built from Baton Rouge, La., to Greensboro, N. C. It will include steel tank storage units, pumping station and other facilities. Cost over \$350,000 with equipment.

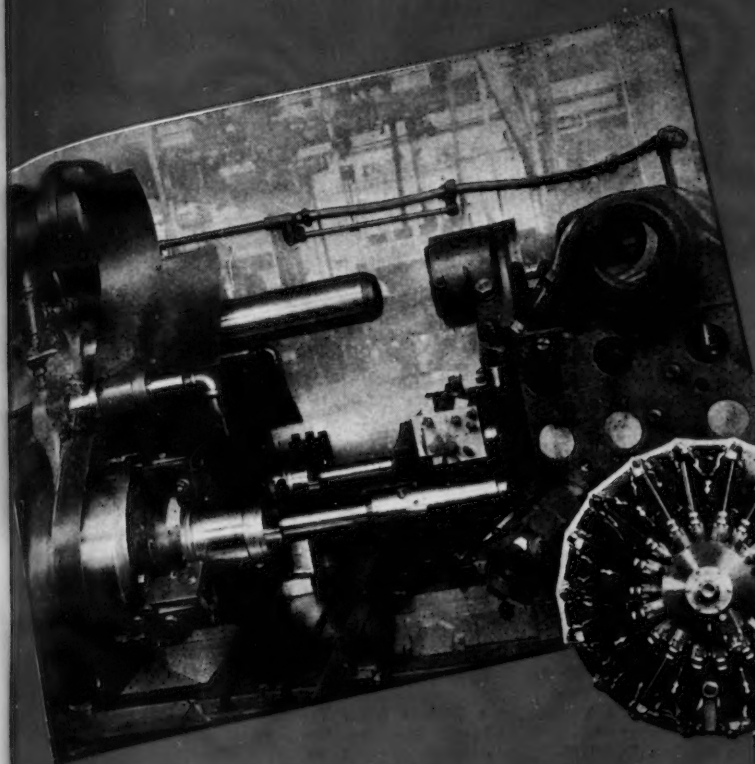
**Bureau of Yards and Docks**, Navy Department, Washington, asks bids (no closing date stated) for diesel engine-driven centrifugal pumps and auxiliary equipment for pumping station at Florida City, Fla., for water supply at naval station, Key West, Fla. (Specification 10474).

**Choctaw Culvert & Machinery Co.**, 491 South Second Street, Memphis, Tenn., metal culverts, mechanical equipment, etc., plans new one-story plant at Greenwood, Miss. Cost close to \$65,000 with equipment.

**International Harvester Co., Inc.**, 180 North Michigan Avenue, Chicago, has let general contract to V. P. Loftis, Builders' Building, Charlotte, N. C., for new one-story factory branch,

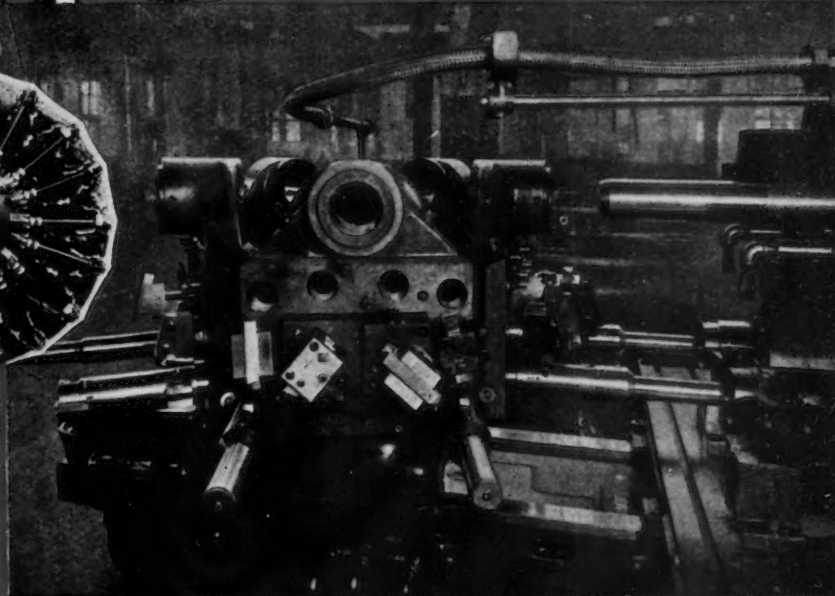


# EXTERNAL AND INTERNAL OPERATIONS ON AIRCRAFT ENGINE CYLINDERS ... HANDLED SIMULTANEOUSLY ON A



**P & J**

**5D12  
2 SPINDLE  
POWER FLEX**



**PRODUCTION**  
**5.8 CYLINDERS PER**  
**51 MIN. HOUR**

Through the use of special tooling and a rigid type of overhead pilot, this two spindle P & J machine set up in the plant of Lycoming Division, Aviation Manufacturing Corp., Williamsport, Pa., is an outstanding contribution to aircraft cylinder production.

Tooling for first or internal operation is mounted on turret in alignment with rear spindle while second or external operation is tooled up in alignment with front spindle. The two holdings (one on each subject) are performed simultaneously, with a three jaw chuck and an air operated fixture on rear and front spindles respectively. One cycle of machine brings the rough machined steel forgings up to the finning operation handled on another type machine.

In addition to high productive capacity, the P & J Automatic assures flexibility, ease of change over, minimum floor space, low power consumption, rigidity and high finish accuracy. Many modern features of the 5D12 Power-Flex provide a machine which is ideal for aircraft engine work demanding economical production, extremely fine finish, accuracy and heavy cutting under continuous operation.

One operator can readily handle two or even three machines on this class of work.

## OPERATIONS PERFORMED

**REAR SPINDLE:** (Presenting thread end to spindle).

1st T. F.—Loading Bar.

2nd T. F.—Rough bore hole half way; rough turn 4.75"—4.841 dia.; rough face end; rough turn and straddle face flange; rough form groove.

3rd T. F.—Semi-finish above cuts; chamfer.

4th T. F.—Size turn 4.841" dia.

5th T. F.—Unloading.

**FRONT SPINDLE:** (Presenting finished end to spindle. Locate in ring on 4.841" dia. and hold back against hardened and ground steel plate with 3 air operated fingers or clamps over flange).

1st T. F.—Loading.

2nd T. F.—Rough bore hole half way; rough turn and face finished dia.; rough turn thread dia.; rough face end.

3rd T. F.—Semi-finish above cuts; chamfer corners; turn 4.910" dia.; bore hole through.

4th T. F.—Ream hole 4.608" dia. through.

5th T. F.—Unloading bar.

**POTTER & JOHNSTON MACHINE CO. PAWTUCKET RHODE ISLAND**

storage and distributing plant, with service department, at Charlotte. Cost over \$65,000 with equipment.

**Ford, Bacon & Davis, Inc.**, 39 Broadway, New York, consulting engineer, has contracted with government for an ammunition loading plant at Jacksonville, vicinity of Little Rock, Ark., consisting of one and multi-story buildings, shops, warehouses, boiler plant and other structures. Cost about \$30,000,000, fund in that amount to be furnished by government.

**Lone Star Gasoline Co.**, Longview, Tex., has approved plans for new gas recycling plant at Willow Springs, Tex., for natural gas distribution, including compressor station, boiler house, steel tank storage units and other facilities. Cost over \$350,000 with equipment.

**Texas Chemurgic Industries, Inc.**, Southland Life Annex, Dallas, Tex., plans new sweet potato dehydration plant near Bowie, Tex. Also will build boiler house and machine shop. Cost close to \$100,000 with equipment.

## Central States

• **Wright Aeronautical Corp.**, Lockland, Cincinnati, has let general contract to Frank Messer & Sons, Inc., 2515 Burnet Avenue, Cincinnati, for one-story addition, 200 x 250 ft., to new local plant for production of engines for government. Cost close to \$100,000 with equipment. Albert Kahn Associated Architects & Engineers, Inc., Detroit, is architect and engineer.

**McKinney Tool & Mfg. Co.**, 1688 Arabella Avenue, Cleveland, special machinery and parts, plans one-story addition, 85 x 175 ft. Cost over \$80,000 with equipment. Edward G. Hoefler, 5005 Euclid Avenue, is consulting engineer.

**Park Drop Forge Co.**, East Seventy-ninth Street and Gordon Park, Cleveland, drop forgings, automobile crankshafts, etc., has let general contract to Brown Construction Co., Euclid Building, for one-story addition, 150 x 240 ft., for a machine shop. Cost about \$160,000 with equipment. A. E. Rowe, 1900 Euclid Avenue, is architect and engineer.

**Timken Roller Bearing Co.**, Dueber Avenue, S. W., Canton, Ohio, has let general contract to Gibbons-Gable Co., Mellett Building, for one-story addition; also for steam power house, 60 x 100 ft., and 75 ft. high. Cost over \$400,000 with equipment.

**Lees-Bradner Co.**, 6210 Carnegie Avenue, Cleveland, gear machinery and other machine tool products, plans expansion for production for government, to cost about \$281,400 with equipment. Fund in that amount is being secured through Defense Plant Corp., Washington.

**Triangle Tool & Die Co.**, 815 East Sample Street, South Bend, Ind., plans new one-story plant on Lincolnway East. Cost close to \$50,000 with equipment.

**Indianapolis Power & Light Co.**, 17 North Meridian Street, Indianapolis, plans expansion in steam-electric generating station on Harding Street, including new 37,500-kw. turbine-generator and auxiliary equipment. Contract for generator has been let to General Electric Co., Schenectady, and awards for other equipment will be made soon. Cost close to \$2,000,000 with machinery.

**Contracting Officer**, Quartermaster Corps, Jeffersonville, Ind., asks bids until July 21 for 228 tool sets for wheelwrights and carpenters; 228 tool sets for blacksmiths; and 228 tool sets for plumbers (Circular 431-482).

**Crown Cork & Seal Co.**, 5622 Natural Bridge Avenue, St. Louis, has let general contract to A. Monschein Construction Co., 1609 North Eleventh Street, for second story addition to present one-story plant, 52 x 200 ft. Cost over \$60,000 with equipment.

**Beech Aircraft Co.**, East Central Road, Wichita, Kan., airplanes and parts, will begin work soon on one-story addition, 100 x 160 ft., for service and maintenance shop. Cost over \$60,000 with equipment. Overend & Boucher, Brown Building, are architects and engineers.

**Emerson Electric Co., Inc.**, 8100 Florissant Road, St. Louis, motors, fans and other electrical products, has contracted with War Department for production of standardized aircraft machine gun turrets, and has secured initial fund of \$1,000,000 from government

for tools and equipment. War Department has acquired tract adjoining Emerson works for plant noted to cost close to \$10,000,000 with machinery.

**Coleman Lamp & Stove Co.**, North St. Francis Street, Wichita, Kan., kerosene and gasoline pressure apparatus for domestic service, has let general contract to Hahner & Foreman, 111 North Waco Street, for one-story and basement addition, 80 x 140 ft. Cost over \$60,000 with equipment. Lorentz Schmidt, 1832 East Second Street, is architect.

**Fruehauf Trailer Co.**, 10940 Harper Avenue, Detroit, motor trailers and parts, plans expansion for production for government. Similar extensions will be carried out at branch works at Kansas City, Mo. Entire project will cost close to \$800,000 with equipment.

**National Brass Co.**, Grand Rapids, Mich., brass and bronze hardware, screw machine products, etc., has let general contract to Strom Construction Co., Grand Rapids, for one-story addition. Cost over \$50,000 with equipment.

**E. I. du Pont de Nemours & Co., Inc.**, R. & H. Chemicals Division, du Pont Building, Wilmington, Del., chemicals and colors, case-hardening compounds, etc., has purchased about 20 acres of river front property near Detroit for new plant for manufacture of chlorinated solvents and allied specialties. Cost over \$400,000 with equipment.

**American Coil Spring Co.**, Muskegon, Mich., steel springs, is erecting one-story addition, for which general contract has been let to Strom & Strom, Inc., Muskegon. Cost close to \$50,000 with equipment.

**Fisher Body Division**, General Motors Corp., Detroit, plans expansion and improvements in local plant and branch works at Muncie, Ind., for production of aircraft parts for government. Fund of \$894,000 will be provided by Defense Plant Corp., Washington, of which about \$350,260 will be expended for buildings and \$543,740 for equipment.

**Perfection Gear Co.**, Vincennes Avenue and 152nd Street, Harvey, Ill., gears and transmission systems, has asked bids on general contract for one-story addition, 125 x 192 ft. Cost close to \$100,000 with equipment. Theodore H. Braun, 123 West Madison Street, Chicago, is architect.

**Rockford Bolt & Steel Co.**, Mill Street, Rockford, Ill., bolts, nuts, washers, screws, etc., has let general contract to Linden & Sons, Inc., 1102 Tenth Street, for one-story addition, 60 x 160 ft. Cost close to \$80,000 with equipment. R. R. Wood, Melrose Park, Ill., is consulting engineer.

**Barlow & Seelig Mfg. Co., Inc.**, Ripon, Wis., washing machinery and parts, is erecting one-story addition, 35 x 128 ft., for which general contract recently was let to Denbrook Construction Co., Ripon. Cost close to \$75,000 with equipment. Roger A. Sutherland, 259 East Wells Street, Milwaukee, is architect.

**Socony-Vacuum Oil Co.**, Federal Reserve Bank Building, Kansas City, Mo., plans new lubricating oil plant at Sixteenth and Perry Streets, Omaha, Neb., including storage and distribution buildings, steel tanks and other facilities. Cost over \$250,000 with equipment.

**American Flange & Mfg. Co.**, 825 South Kilpatrick Avenue, Chicago, weldless flanges and kindred products, has asked bids on general contract for three-story addition, 75 x 285 ft. Cost close to \$160,000 with equipment. William S. Crosby, 6 North Michigan Avenue, is architect.

**Stokerunit Corp.**, 4548 West Mitchell Street, Milwaukee, stoker drives and allied mechanical equipment, plans one-story addition to machine shop. Cost over \$45,000 with equipment. Fred Pfeiffer is company engineer.

**Minneapolis-Moline Power Implement Co.**, Twenty-ninth Street and Minnehaha Avenue, Minneapolis, will take bids soon for superstructure for one-story addition, 140 x 325 ft., at Hopkins, for expansion in assembling division. Contract for foundations has been let to E. M. Ganley Co., Inc., 2922 Oakland Avenue. Cost about \$250,000 with equipment.

## Western States

• **Consolidated Steel Corp.**, 5700 South Eastern Avenue, Los Angeles, is arranging with Los Angeles Harbor Commission for lease of

90-acre waterfront on West Basin, San Pedro Harbor, for new shipbuilding plant. Eight shipways are planned, four to be built at once and remainder later, with shops, warehouses, boiler house and other structures. Cost over \$2,000,000 with equipment.

**Autometric Machine Tool Co., Inc.**, Ninth Street and Dwight Way, Berkeley, Cal., has let general contract to H. H. Larsen Co., 64 South Park Street, San Francisco, for one-story addition, 100 x 200 ft., for expansion in machine shop. Cost close to \$90,000 with equipment. L. H. Nishkian, 525 Market Street, San Francisco, is engineer.

**Bureau of Reclamation**, Denver, asks bids until July 30 for 18 102-in. conduit tube valves, 18 sets of 102-in. conduit linings, and four or eight 102-in. welded steel temporary conduit units for installation in river outlets, Shasta dam, Central Valley project, Cal.; until July 14 for ventilating equipment for Shasta hydroelectric power plant, same project (Specifications 971 and 1527-D, in order noted).

**Todd Shipbuilding Co. of California**, Latham Square Building, Oakland, Cal., Henry J. Kaiser, president, plans new magnesium plant in Washington, where site is being selected. It will include storage and distributing structures, shops, power station and other buildings. Application has been made to Bonneville Power Administration, Portland, Ore., for power supply from Bonneville hydroelectric power station. Work is scheduled to begin early in fall. Cost over \$5,000,000 with equipment. Company is completing similar plant at Permanent, Cal., to begin operations in August. Chemical Engineering Division of company is in charge.

**Associated Canneries, Inc.**, 3350 Pacific Avenue, Ogden, Utah, food packer and canner, plans rebuilding part of processing and canning plant recently destroyed by fire. Loss about \$70,000 with equipment.

## Canada

• **Walker Metal Products, Ltd.**, 1511 Kildare Road, Windsor, Ont., metal goods, has let general contract to Hein Construction Co., Ltd., 172 Aylmer Avenue, for one-story addition, 100 x 130 ft. Cost over \$65,000 with equipment.

**Naugatuck Chemicals, Ltd.**, care of Dominion Rubber Co., Ltd., 550 Papineau Street, Montreal, recently organized as a joint subsidiary of latter company and Naugatuck Chemical Division, United States Rubber Co., Inc., New York, plans new works at Elmira, near Kitchener, Ont., for production of aniline oil, used for war purposes, and for chemicals used in rubber manufacture. It will include power house, machine shop and auxiliary buildings. Cost over \$350,000 with equipment.

**Canadian Westinghouse Co., Ltd.**, 286 Sanford Avenue, Hamilton, Ont., has awarded general contract for \$50,000 plant addition to W. H. Yates Construction Co., Ltd., 400 Wellington Street North. Hutton & Souter, 36 James Street South, are architects.

**Aluminum Co. of Canada, Ltd.**, 1155 Metcalfe Street, Montreal, has awarded general contract to Foundation Co. of Canada, Ltd., 1538 Sherbrooke Street West, for 12 pot rooms at its plant at Arvida, Que., to cost \$3,000,000. Company also has awarded general contract to Anglin Norcross Corp., Ltd., 892 Sherbrooke Street West, Montreal, for a laboratory, testing and office building at Kingston, Ont., to cost \$275,000.

**Montreal Locomotive Works**, Longue Pointe, Montreal, has awarded general contract to Douglas Bremner Construction Co., Ltd., 2049 McGill College Avenue, for a plant addition for production of war tanks, etc.

**International Nickel Co. of Canada, Ltd.**, Port Colborne, Ont., H. H. Walters, local manager, is considering plans for a plant addition to cost about \$100,000.

**Alberta Pacific Lumber Co.**, and H. R. MacMillan Enterprises, Port Alberni, B. C., W. J. Van Dusen, vice-president, has plans for a plywood plant to cost \$500,000 with equipment.

**Dearborn Chemical Co., Ltd.**, 2454 Dundas Street West, Toronto, has awarded general contract to Harry Jennings & Son, 49 St. Clair Avenue West, for a plant addition to cost about \$35,000, exclusive of equipment.